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Radium in the Treatment of Epithelioma of the Lip

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THERE is probably no field in which the possibilities of radium therapy are more important than in epithelioma of the lip. Of all the epidermoid carcinomas it occupies at once the most conspicuous and accessible location. It is, comparatively, very frequent in occurrence. Very early in its course it causes subjective symptoms and leads the patient to seek advice. Of all forms of cancer it offers least excuse for failure to make a correct early diagnosis. So strongly do we feel about this that I will say frankly we are, in most instances, opposed to a biopsy as an aid to diagnosis. The appearance is quite characteristic to any one familiar with epithelioma. At the Memorial Hospital no case is referred for treatment without the opinion of the combined attending staff or a number of its members. We therefore feel that the clinical diagnosis is adequately confirmed, once it is reviewed by a number of men all well trained in the diagnosis of cancer. While we favor the taking of tissue for examination, as a general rule, we feel that most cases of lip epithelioma are exceptions, for various reasons. Many cases present themselves at a stage when the doing of a

biopsy would mean the removal of a very appreciable percentage of the growth, virtually a partial excision. These growths are surrounded by a zone of lymphocytic infiltration during their early stages so that removal of a section is very liable to interrupt this and open wide the channels of dissemination. The procedure is distinctly painful for the patient unless an undue amount of monipalation is carried out to render the area insentitive. The removal of a small neoplastic nodule from the surface of the more advanced lesion is of course another matter and can do no harm. The question of monipalation is one which I think has not received proper consideration. Since this is one of the lesions which we are permitted to see at an early stage, more frequently than with most malignant diseases, we should not handicap our favorable opportunity by permitting several men to squeeze and massage it for the purpose of satisfying what frequently appears to be idle curiosity. If the disease is localized to begin with it has little chance of remaining so after the usual examination in the average clinic.

True epithelioma of the lip, that is, the lesion beginning on the

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vermilion border of the lip, is always epidermoid or squamous cell epithelioma.

Basal-cell epithelioma may involve the lip, but, if so, it is always by extension from the skin surface beyond the mucocutaneous junction: this should not be classified as true epithelioma of the lip. This extension occurs much more frequently from the skin of the upper lip and, as is well known, squamous cell epithelioma primary on the upper lip is relatively rare.

As is true of epidermoid carcinoma elsewhere, that of the lip presents two distinct types, the

nodules: the base is but slightly infiltrated, giving the impression of a lesion set upon the lip rather than invading it. The ulcer may be of considerable extent, frequently covering the greater part of the mucosa of the lip or even appearing as isolated islands of ulceration. Their chief characteristic is this early extension at the expense of the mucosa with deeper infiltration only in the later stages. This type responds readily to surface radiation. Glandular involvement is rare until the disease has progressed to the point of invasion of the deeper structures of the lip.



Figure 1.—Superficial papillary type of epithelioma of the lip before and after treatment by surface radiation.

superficial papillary and the deeply infiltrating ones. These present in their early stages marked differences both histologically and clinically. They also offer considerable difference from the standpoint of prognosis. The superficial papillary type early in the disease presents an ulcer of varying size frequently covered by a crust which drops off and reforms periodically. If this crust be removed carefully the surface of the ulcer will be found covered by small characteristic neoplastic

The deeply infiltrating type is characterized by a relatively small area of surface ulceration at first. The ulcer is always deep in its infiltration with raised indurated edges and may be crateriform in appearance with central sloughing. The growth progresses by invasion of the deeper structures in a more or less spherical manner so that on palpation it presents a well circumscribed globular tumor. In this type the surface ulceration gives no indication of the extent of the disease.

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It is a much more malignant growth than the superficial papillary type and is often more difficult to influence by radiation. Extension to the cervical nodes is earlier and more frequent.

The surgical experience with cancer of the lip has been relatively favorable when we compare the results with those obtained in epidermoid carcinoma elsewhere. Ewing (1) quotes Fricke as placing the cures at 60 per cent and Steiner at 70 per cent for a five-year period. He also notes that surgical experience emphasizes the necessity of a bilateral neck dissection. Rib-

twenty or 95 per cent remained well five years. Of twelve cases showing metastases in the nodes only six or 50 per cent remained well five years. In a series of 516 cases operated upon Broders (5) was able to trace 306. Of the group traced 182 or 59.5 per cent were living and 169 or 92.8 per cent of the living were free from disease. The average duration of the post-operative period was 7.76 years. One hundred and five patients with metastases were operated upon and of these sixty-nine were traced—twelve were living and of these ten were free from disease for periods ranging from



Figure II.—Papillary type of epithelioma of the lip before and after treatment by surface radiation.

cray (2) reports ninety-six operative results, with two deaths, and so apparently cured although not all of these have passed even the three-year period. In a series of 200 cases Dollinger (3) reports 158 primary lesions in which operation gave 70.7 per cent free from disease for three years and 69.6 per cent for five years. In a report of thirty-three cases Bloodgood (4) found twenty-six or 78.7 per cent well five years. In twenty-one of these cases no metastases were found in the lymph nodes removed and of this group

3.29 to 11.73 years. No patient with extension to the deeper cervical lymph nodes or to more than one group of nodes was known to be alive. Von Bonsdorff (6) places the three-year cures at 80 per cent and has made the further interesting observation that 90 per cent of recurrences occur before the end of the third year. The difficulty of tracing post-therapeutic lip cases is especially great because many patients cannot be impressed with the seriousness of their condition and disappear from observation immedi-

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ately the lesion or wound is healed. For this reason statistics are only approximately correct and it would be by no means fair to classify as unfavorable all patients who failed to report their condition subsequently. However, a fair approximation would seem to place the results as about 70 per cent clinically free from disease for a five-year period.

Such results would be excellent were they not obtained at the expense of such sacrifice of tissue. It is true that the radical surgical procedure, with a seven-out-of-ten chance of winning, is but a slight sacrifice in dealing with a

stances, especially if an adequate operation has been done. The base of this excision is upward whereas the broad spreading infiltrating base of the neoplasm is downward. When we consider the two types of lip epithelioma it is at once evident that the greater amount of tissue is sacrificed in dealing with the less malignant of the two forms and it is undoubtedly the hesitancy on the part of the surgeon to make a sufficient sacrifice in many cases that accounts for so many local recurrences in the scar. To say the least, the method is both awkward and unscientific.



Figure III.—Infiltrating carcinoma of lip before and after treatment by surface radiation.

disease which is so fatal. It is also true that, as long as we offer such a procedure as the final word, the average layman will hesitate to accept it until his best chance is lost. While it is no fault of surgery that he hesitates it is nevertheless human nature.

The surgical procedure itself is open to criticism on two points. In dealing with the primary growth the usual method is the V-shaped excision. While this is termed a deformity of no consequence it is nevertheless an uncomfortable deformity in most in-

In dealing with the cervical nodes the routine bilateral block dissection is followed as the orthodox procedure. This surgical viewpoint has been forced by the fact that a much higher death rate ensues once metastases have become firmly established in the glands. Bloodgood's report of twenty out of twenty-one cases, in which no metastases were found in the nodes after removal, remaining well five years is indeed strong evidence in favor of early block dissection of the neck. Only 50 per cent of his cases with

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glandular involvement remained well five years. In Broder's (5) statistics, of 516 cases operated upon, the regional nodes were removed in 499 cases or 87 per cent. Of these, glandular metastases were found in only 105 or 23.38 per cent. In other words, 344 patients or 76.6 per cent—at least nearly that number, allowing for some failures to demonstrate existent metastases—were operated upon unnecessarily. If every case with cancer of the lip is to be subjected to such a blanket rule an appalling number of unnecessary operations must be undertaken.

After classifying the cases in this manner would it not be possible also to ascertain whether the death rate would be increased by following an expectant plan of treatment and reserving our surgery until a definite node is palpable. It is true that the co-operation of the patient is necessary for the period of observation, but I believe with proper instruction and adequate follow-up through social service work the number of losses or mistakes can be reduced to a negligible percentage. According to Von Bonsdorff's statistics, this would not mean frequent



Figure IV.—Infiltrating epithelioma of lip before and after treatment by a combination of surface and interstitial radiation.

The method does seem unscientific.

Would it not be better to attempt to ascertain whether the death rate would be increased by separating those cases in which metastases are most liable to occur from those in which they probably will not occur. We know that the superficial papillary type of growth is much less liable to extend to the nodes. We know also that age and rate of growth are factors of consequence.

examinations for the remainder of the patient's life.

By intelligent co-operation on the part of the patient it is possible to palpate the involved node in the average neck before its capsule is perforated. In this stage the node performs a conservative function. It demonstrates the direction the metastasizing is taking through the lymphatic channel and holds the disease in check until it can be intelligently dealt with. It has been

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my experience that a dissection at this time reveals usually only one or two nodes involved. It is rare that a chain of nodes are found involved until late in the disease. This seems true of all cervical metastases of intra-oral epidermoid carcinoma. The mode of dissemination itself is a factor in favor of conservatism. I believe we are now fairly well agreed that cancer cells do not grow along the lymphatic channels like a vine along the ground, but that extension is by embolism.

If we add to our expectant plan of treatment of the nodes the use

tion can be applied from three sides and for this we employ the method previously described by the late Doctor Janeway (7). It is to Doctor Janeway also that we owe practically all of our present technique in the treatment of this disease.

A mould of the lesion is made of dental modelling compound held in place by the teeth, and care taken that it fits well down into the bucco-gingival groove inside and extends well beyond the limits of the lesion externally. This mould is then taken to the laboratory where, with a heated

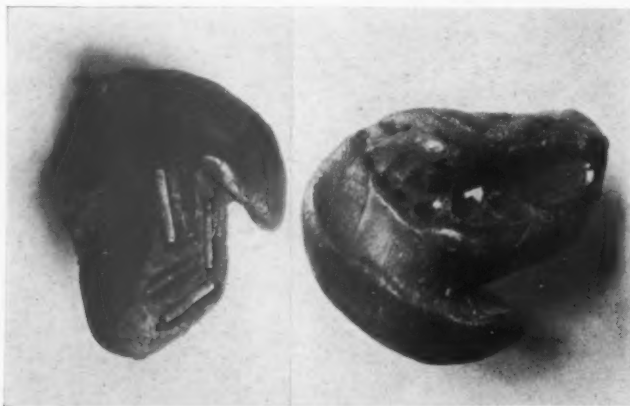


Figure V.—Dental modelling compound applicators with and without radium tubes sealed in place.

of the physical agents as well, it seems to me we are approaching the problem in a much more scientific manner.

In our work at the Memorial Hospital we have therefore divided the treatment of epithelioma of the lip into two distinct parts

PART I.

Treatment of the Primary Lesion.

The primary growth in the lip lends itself admirably to the application of radium and in the treatment of this part of the disease we feel very strongly that surgery occupies no place. The location is such that surface radia-

tion can be applied from three sides and for this we employ the method previously described by the late Doctor Janeway (7). It is to Doctor Janeway also that we owe practically all of our present technique in the treatment of this disease.

A mould of the lesion is made of dental modelling compound held in place by the teeth, and care taken that it fits well down into the bucco-gingival groove inside and extends well beyond the limits of the lesion externally. This mould is then taken to the laboratory where, with a heated

tool or gouge, furrows are made in it into which filtered tubes of radium are placed. These tubes are then sealed in place by pouring over the surface some melted paraffin. For filtration we employ tubes of 0.5 mm. silver which removes approximately 95 per cent of the total radiation. These tubes are sunk into the mould to a depth of 4 mm. in order to give a more equal distribution of radiation and are so arranged that one tube is available for each sq. cm. of surface to be covered. Care is taken that the tubes extend well

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beyond the palpable borders of the growth. With this method an excellent cross-fire is obtained. The rigid mould conforms accurately to the contour of the lesion and since it is made to fit between the teeth it must remain exactly in place. For lesions of ordinary size a dosage of 60 to 65 mc. hrs. per sq. cm. of sur-

every case of lip cancer. For the primary papillary type of growths and for many of the deeply infiltrated ones it is all that is necessary. Usually one application is sufficient to effect a complete regression of the growth. In certain deeply infiltrating recurrent growths as well as primary lesions of similar type it is necessary to

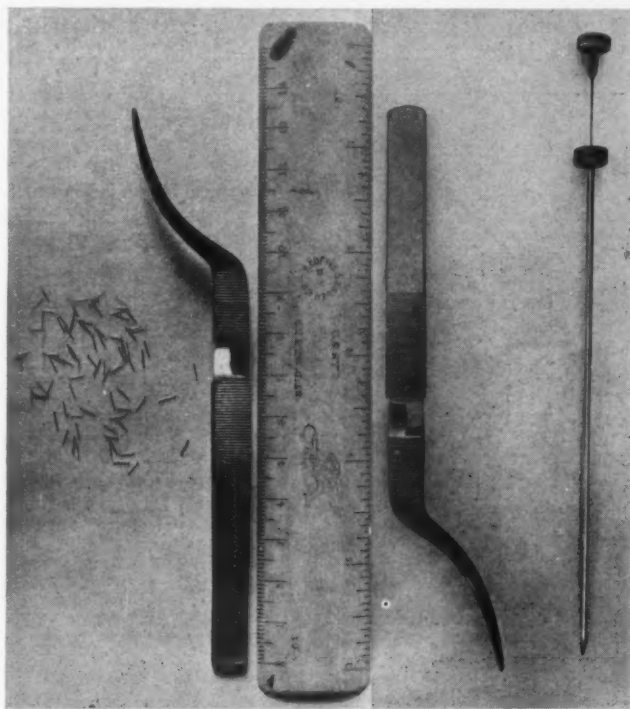


Figure VI.—Showing tubes of unfiltered radium emanation and the trocar needle used for burying them interstitially.

face is employed, but if it is very extensive this is slightly reduced because of the curved surface and amount of additional cross-fire. The most important point in applying radium in this manner is to have the tubes extend well beyond the limits of the growth in all directions.

This method of radium application is employed in practically

supplement this surface application by burying emanation in the substance of the neoplasm. For this purpose small glass capillary tubes 3 mm. in length and 0.3 mm. in diameter containing not more than 1 mc. of radium emanation are inserted interstitially by means of fine trocar needles, and left in situ. The use of 1 per cent novacaine as a local anaesthetic

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renders the procedure painless and simple. Emanation buried in this manner decreases in value at the rate of approximately 15 per cent per day so that a very prolonged radiation is effected. Since the capillary tube removes little more than the alpha rays the full intensity of both beta and gamma rays is obtained in the most inaccessible portion of the growth. One mc. of emanation gives a total radiation equivalent

by the trauma of introducing the needles, much more remote.

PART II.

Treatment of the Cervical Nodes.

As suggested before we have taken a very conservative position in the treatment of the cervical nodes and as time goes on we feel more strongly convinced that this has been advisable. The chief criticism I feel we should make of ourselves is that in the earlier part of our work we did not fol-



Figure VII.—Pack and tray used for applying heavily filtered radium externally over the neck.

to about 132 mc. hrs. We have had no ill effects from the small glass capillary tubes as foreign bodies, but I believe it is always wise to employ surface radiation first, even though an interstitial application is contemplated from the beginning. The external radiation renders the possibility of dissemination of malignant cells,

low up external radiation as vigorously as should have been done. During the past year we have endeavored to radiate all necks externally. For the more favorable cases we have used radium, for the remainder x-ray, and in some a combination of the two agents. In those cases having no palpable nodes this has been with

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the idea of stimulating the protective defences in the lymphatics and destroying minute metastatic foci at a time when they are of least proportions. In cases where palpable nodes have already appeared it is done with the hope of rendering the disease in this location temporarily less malignant and therefore a safer operative risk. A considerable series of nodes studied microscopically suggests that this has been accomplished. I wish to make clear in this connection, however, that by external radiation alone we do not feel we have ever been able to

not remove all of the possible avenues of dissemination. It does, however, remove one of nature's chief barriers, frequently at a time when such are needed most. Many patients are not physically able to withstand such an operation. If extension to the nodes be embolic, as most of us believe, then it is quite possible that a great deal of needless surgery, with its resultant surgical shock, may be carried out and still the one small dangerous focus left unnoticed, but probably stimulated to greater activity. In cases where no cervical nodes are palpable

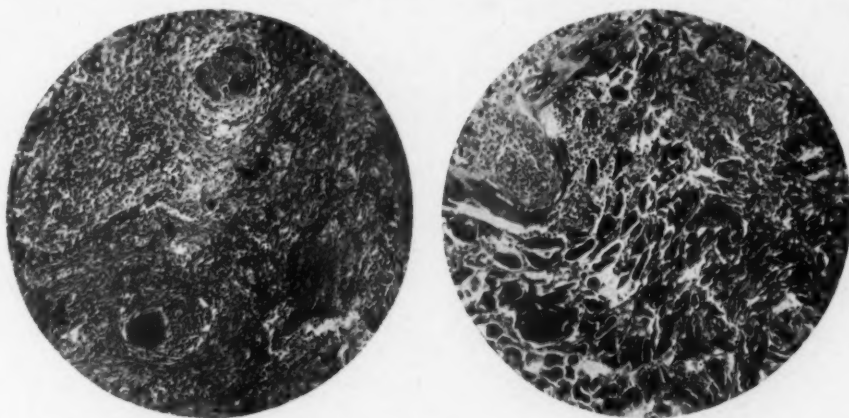


Figure VIII.—Microphotographs of four cases treated by external radiation over involved cervical nodes and followed by complete surgical dissection.

destroy, completely, fully developed epidermoid carcinoma in the cervical nodes.

We feel that the cervical lymphatics perform a conservative function, representing one of nature's barriers to the disease, and that unless definite involvement is noted they should not be interfered with surgically. A very considerable percentage of cases does not develop metastases in the neck at all or until late in the course of the disease. This is more especially true in elderly patients. The routine block dissection as commonly practiced, does

our plan has been to apply external radiation and keep the patient under observation. If a palpable node which is clinically malignant and not simply inflammatory, appears we then do a complete dissection of that side of the neck under local anaesthesia, removing the entire chain of nodes and burying small doses of radium emanation well distributed in weak tubes at all suspicious points where the lymphatic channels are severed. By burying the emanation in this manner we get a very uniform radiation throughout the entire

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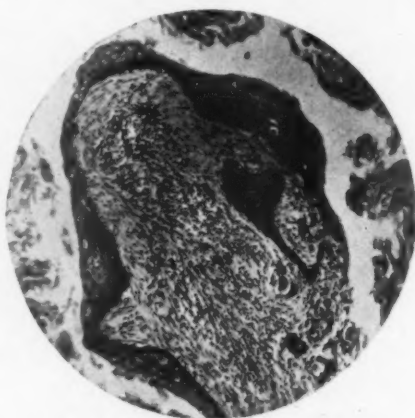
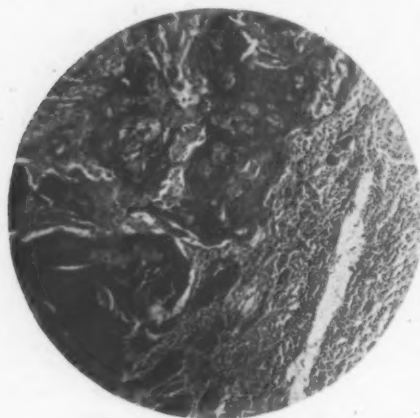
operative field, carried over a prolonged period and without appreciable gross destruction of tissues. Healing of the wound is complete before the intensity of the radiation becomes apparent.

In cases where the glandular mass has perforated its capsule and is extensively invading surrounding structures, such as the sterno-mastoid muscle or the great vessels, it is better to bury radium emanation uniformly throughout the mass, in the same manner as previously described, and close the wound. With the parts exposed in this way accurate approximation of the radium can be made

better controlled, more careful work can be done and many patients may be cared for in this way who could not withstand a general anaesthetic.

Statistics of Treated Cases.

During the past four and a half years we have treated at the Memorial Hospital 162 cases of epithelioma of the lip. A considerable percentage were recurrent cases and many of these were very advanced. I am convinced that several cases would have been better off had no treatment been given. There comes a period in the course of the disease when we must recognize the fact it is



and nature's barriers are left intact. The metastatic mass thus left intact affords a support for the emanation tubes such as could not be obtained in any other manner. While we sometimes see remarkable clinical results follow the surgical removal of such masses, still, I believe that these are more or less accidental and that as a whole the results are very unsatisfactory.

I should like to emphasize the doing of the neck dissection under local anaesthesia. It does away with the danger of post-anaesthetic pneumonia, hemorrhage is

even too late for the palliative use of physical agents.

In this series of 162 cases, ninety-two were primary without demonstrable cervical nodes, eleven were primary with nodes, and fifty-nine were recurrent.

Of the recurrent cases sixteen were recurrent in the nodes only, twenty-six at the local site only, and seventeen both locally and in the regional nodes.

Of the entire series 115 cases have been traced to date and forty-seven untraced. We have found it very difficult to trace many of our earlier cases because

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once free from evidence of the disease many patients feel they are then brought back only to satisfy the curiosity of the physician. More recently we have made a point to instruct the patient, or a responsible relative, in the gravity of the condition and this, together with a careful follow-up through our social service department, has been productive of much better results. While we ordinarily classify all untraced cases as having been victims of the disease, I do not feel that it is fair to extend this to the lip cases, altogether. Some of the trouble here is due to indifference on the part of earlier cases.

Of the 115 cases traced, 80 or 69.5 per cent are now free from disease. Of these sixteen are over three years duration and four over four years. The average period of freedom from clinical evidence of the disease is eighteen months.

Twenty-seven cases are known to have died and eight more are steadily becoming worse. In all, twenty-two neck dissections have been done following the plan previously outlined. Fifteen are now clinically free from disease for periods ranging from four months to four years, the average being eighteen months for the group. Six cases died at periods of four months to two years after operation; the average duration of life following operation being fourteen months. One case has recently recurred and is steadily becoming worse.

Of the ninety-two cases primary without palpable nodes at the time of admission nine, or 9.8 percent, developed nodes subsequently. Of these eight, or 90.2 per cent, are now, following combined radiation and surgical dissection, clinically free from disease for periods of four months

to over four years, the average period being nineteen months. One patient died of recurrence nineteen months after the neck operation.

Of this series of ninety-two cases primary without palpable nodes at the time of admission, sixty-seven or 72.8 per cent are now known to be clinically free from disease. Two died of intercurrent disease and another died of apoplexy, although at that time clinically free from carcinoma. The remainder of the series have been untraced.

Conclusions

In our opinion the primary lesion in epithelioma of the lip should be managed entirely by the use of radium. For the average case surface radiation is sufficient while in a few of the more deeply infiltrating lesions this surface application should be supplemented by the use of radium emanation imbedded interstitially.

The cervical nodes should be treated conservatively. External radiation to the neck is indicated at once in all cases admitted for treatment. Following this, cases without palpable nodes should be kept under observation after a sufficient period of external radiation. If nodes are present or appear subsequently, a complete unilateral neck dissection under local anaesthesia, coupled with the use of radium emanation in very weak tubes buried throughout the wound, is indicated. Dissection of the opposite side may be done subsequently if indicated by the presence of nodes. External radiation following operation is advisable in the majority of cases.

While the time factor is still too short to permit of comparison with surgical statistics, we feel convinced from our experience in

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this group of unselected cases that radium deserves the foremost place in the treatment of lip cancer. If properly applied it bids fair to produce results surpassing our present surgical statistics. These results can be obtained with a minimum of sacrifice on the part of the patient. Except in the event of a neck dissection, his daily work need not be appreciably interrupted. The resultant scar is in most instances scarcely discernible. By the conservative treatment of cervical nodes a vast amount of needless surgery can be eliminated. All of this tends to remove doubt and fear from the mind of the patient and promises to bring him for advice and treatment at an earlier and more favorable time in the course of his disease.

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DR. GEORGE E. PFAHLER, Philadelphia: I have been very much interested in this subject and I agree with all Dr. Quick has said. I believe it is a safe procedure to follow. During the past ten years it has been my practice in all primary lesions in which I could afford to lose a little tissue of the lip to destroy the lesion thoroughly and distinctly beyond

palpable evidence of the disease by means of electro-coagulation and then apply radiation either by means of x-ray or radium and then follow by x-ray or radium treatment of the sub-maxillary region. Up to the present time every patient, so far as I have known or been able to determine, has gotten well, except one I am working on now, about whom I am a little doubtful. I still think he may get well, but it is the only case that has made me doubt the procedure.

One other point regarding the sub-maxillary glands, I believe thorough radiation followed by operation is a very satisfactory procedure, and one I have followed until the past year. During the past year I have been treating some of these lymph nodes by introducing radium needles into the lymph nodes. In that way we are carrying out the idea that Dr. Quick has expressed of walling off the lymphatics. You are not opening up the lymphatics or risking an extension of the disease by opening up the lymphatics. Time will prove whether it is successful. I believe it will be if we use enough radiation to destroy the disease.

In regard to the primary operation in which we cannot afford to lose any more lip—in other words, when the whole or even half of the lip is destroyed by disease—in those cases by very careful treatment with radium we can generally save what lip is left. That is a big help. In the smaller lesions in which we can afford to lose a small part of the lip, I believe preliminary electro-coagulation is of value.

Dr. Quick criticised my electro-coagulation in New York before the Academy of Medicine. I did not have a chance to answer him then, so I will now. He said it opened the lymphatics; that is just what it does not do. It seals off the lymphatics. Let a spouting artery come up before you, put on the high frequency current and you seal it off immediately. Then you have a certain reaction following, which shuts off all those blood vessels.

DR. ALBERT SOILAND, Los Angeles, Cal.: I want to compliment Dr. Quick on presenting one of the most complete papers on cancer of the lip that I have ever had the pleasure of listening to.

One statement in his paper regarding the sole use of radium in treating

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cancer of the lip, I think the x-ray should be included also, because before the days of radium there were thousands of cases of cancer of the lip treated and many successfully with x-rays alone.

In regard to the lymph nodes, we have had several cases where, after radiation of the lip had destroyed the visible lesions, radiation of the nodes had failed to reduce them in size, and we sent the patients to the surgeon. He found they were not metastatic, and that surgical removal was unnecessary. I think this is a point which Dr. Quick brought out and which we should also bear in mind.

DR. HENRY SCHMITZ, Chicago: The paper of Dr. Quick's is certainly very comprehensive and one of the best presentations of the subject I have ever heard. It teaches us two important things. In the first place there is an absolute necessity of studying our cancer cases in order to make out our plan of treatment and in order to be absolutely sure of the prognosis of the case. In the second place, it teaches us that we must not only treat the local lesion but the entire locality that might be involved. It is not necessary that it is involved, but it may be involved. We are often confronted by the question of why we get results in one cancer case and not in another. If we group our cases we can answer this question very soon and Dr. Quick has done this very beautifully. We divide our cases into, first, the simple excision cases; in the second group we place those in which we are not sure that by simple removal of the growth we would remove all the cancer tissue; in the third group, we place those cases in which we are absolutely sure that it would be impossible by surgery to remove all the cancer. Those are the ones that have a very extensive local infiltration and a palpable invasion of the lymphatic glands. In the fourth group we place the cases which are absolutely obscure, in which we cannot palpate or recognize the cancer. In the last group are the recurrent cases. Surgery will invariably cure cases in the first class. I think that in the second class surgery will cure 90 per cent of the cases. In the third class, of course, none at all are cured. These are the three classes that can be successfully treated with x-ray and radium. We can never successfully treat cases in the fourth class. In the first three groups we can absolutely hope for re-

sults, as Dr. Quick has told us. We may have an apparent cure.

The second point that Dr. Quick brought out, which was very important, was to the effect that we should never overlook treating the regional lymph nodes. Personally, it is my belief that if the regional lymph nodes are palpable the case is lost. The effect of radiation or excision is not going to free the patient from cancer. It is my opinion that when the glands are found to contain cancer cells they should be removed. I would remove the glands in every case of cancer either by radiation or the knife. If we do this and treat the disease, we will cure the patient.

DR. A. F. TYLER, Omaha: There are four points that I think I would like to emphasize in connection with Dr. Quick's paper. The first was we should not manipulate cancer of the lip or cancer of any part of the body. I have been so impressed with this that I have tried in teaching students to emphasize that above every other point. The second thing of great importance in treating cancer of the lip or any cancer is to treat the draining lymphatics, as Doctor mentioned, using the same principle as the surgeon has followed for many years. The third point is one that should never be forgotten, that is giving a sufficient dosage. I have followed this rule with considerable satisfaction, namely, that I should treat the local lesion until it appeared to be well and then give it just as much more treatment afterwards. The fourth point is to follow up your cases. Do not be deceived by not hearing from the patients, thinking they are well, because many of those you do not hear about in private practice are those who have gone to other doctors. Dr. Quick has the advantage of some of us in his follow-up system, but any of us can do it by means of a routine system followed up by the stenographer.

DR. DOUGLAS QUICK, New York City (closing): There is another thing about inserting the radium needles or tubes from the outside into the lymph nodes, a thing that has come up with us very frequently. You cannot always tell just where to put them. Without surgical exposure the extent of disease cannot be determined accurately. New growth in the nodes is apt to displace the great vessels so that insertion from without is a dangerous procedure. We have even seen an extremely calcified carotid bulb simulate a diseased node.

Diseases of the Oesophagus

P. F. BUTLER, M. D.

Boston, Mass.

Anatomy

FOR the proper study of diseases of the oesophagus a knowledge of the anatomy of this organ is essential. The oesophagus is a musculo-membranous tube which extends from the pharynx to the stomach. It begins about five inches below the incisor teeth and is about ten inches long in the adult. The cervical portion is 5 cm. long and the abdominal portion about 2 cm. long. Below the diaphragm it has a funnel-like expansion as it enters the stomach. There are three normal narrowings of importance, one at its beginning, one where the left bronchus crosses it and another where it passes through the diaphragm. The capacity is about 100 cc. It is closely related to several important structures; in the neck the trachea lies just in front of it and the lobes of the thyroid gland, especially the left, are adjacent to it; in the chest the left bronchus crosses it just below the bifurcation of the trachea, and the descending aorta is in close relation for some distance. There are two muscular layers, an inner one running horizontally around it and an outer one running longitudinally. The circular fibres aid mostly in peristalsis. The sphincter action at the cardiac end is supposed to have the strength to support a column of water two thirds the height of the oesophagus. A bolus of food normally passes along at the rate of about one inch per second and fluids move through faster than solids.

It is poorly supplied with lymphatics and has no digestive glands.

Technique

Technique is quite important. The oesophagus is best studied by watching the passage through it of an opaque meal. The best meal is barium sulphate and mucilage of acacia, three parts of the former to one of the latter, stirred thoroughly for fifteen minutes. Films and fluoroscope are both used. For the upper part the antero-posterior position is best, and for lower portion the three-quarter position, with right side near the screen, is best. The entire tube is visualized and the normal narrowings and peristaltic waves noted. A distinct pause is seen in the passage of the opaque meal at the entrance through the diaphragm.

Choice of Methods

There are two generally accepted methods of examination, the oesophagoscope and the roentgen ray. The former calls for special skill and training and is dangerous in the presence of aneurism, acute inflammation or extensive new growth. The roentgen ray offers a more convenient, safer and more accurate method of examination.

Diseases

The best classification is that of Jackson; stenotic and non-stenotic. The stenotic are the acute inflammatory, neoplastic, spastic and compression stenoses. The non-stenotic are diverticula, diffuse dilation, paralysis, inflammation and ulceration. In all

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these conditions the roentgen examination is the best method for study, with the possible exception of ulceration and inflammation, and in both these diseases the roentgen ray is a valuable aid. It is my purpose in this short article to describe the more common of these diseases.

1. Congenital Malformations—In these the oesophagus is usually seen ending in a blind pouch. They are sometimes connected by a fistula with the trachea. Both conditions cause death early, one by starvation and the other by inhalation pneumonia.

2. Inflammatory Conditions—Caused by chemical agents or infection. Chemical lesions are usually in the upper portion. Infection may be primary in the wall (which is very rare) or extend from a focus outside. The amount of obstruction depends upon the severity of the mechanical injury, or the extent of the inflammation. There is generally dilatation above the stricture. A stricture may come on early or late. The outlet is always at the dependent point. Tuberculosis ulcers may occur as a direct extension from a process outside the tube. Syphilitic ulcers are rare but may occur and result in contractions and obstruction. Aneurysm pressure and foreign bodies are other causes of ulcers. Ulcers are localized by the barium mixture adhering to them as it passes along the oesophagus. History is important in the differential diagnosis.

3. Neoplastic—These are usually carcinomatous and generally of the squamous celled type. Primary carcinoma of the oesophagus forms about 7 per cent of all carcinomata, and in frequency of occurrence among the different organs it occupies fourth or fifth

place. It is responsible for about three-quarters of all the stenoses of the oesophagus. It is more common in males, the ratio being about 7 to 1. It is seen most often between the ages of 55 and 65. It is usually primary in the oesophagus, although it may be secondary. Metastases may occur but, because of the poor lymphatic supply of oesophagus or early death of patient, they are not often found. It is usually situated at one of the normal narrowings, and this suggests the possibility of continued irritation being a factor in its development. It is most often found at the cardiac end. Hemorrhage is not a common symptom, either by mouth or rectum. Pain is not a common symptom. History is important. Difficulty in swallowing solids is the first sign noted. Increased salivation also is an early symptom. This is followed by rapid loss of weight and strength. The roentgen picture is quite characteristic. The obstructed area is seen as a ragged, irregular lumen, rigid walled and with only a moderate amount of dilatation above. It always extends higher into the oesophagus than the plate shows, and this infiltration does not permit of much dilatation. Perforation is not uncommon and is usually into the trachea or a bronchus. It is inoperable and death ensues in a few months.

4. Spastic Stenosis — Cardio-spasm. An improper name for this condition. The spasm does not occur at the cardia but at the diaphragmatic opening or in the retro-hepatic region of oesophagus. It is generally agreed that there is no sphincter at the cardiac end. It begins as a spasm of the lower end of oesophagus and is believed to be reflex. If the causative factor is not removed

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and the spasm persists it results in hypertrophy of the oesophageal musculature at its lower end, dilatation, kinking, tortuosity and sometimes marked obstruction. It is most often seen in early adult life but may rarely be congenital. The vomitus shows undigested food, no blood or gastric elements and long retained food. It is more marked with cold liquids than with hot. The plates reveal it as a blunt or conical obstruction at the diaphragm with secondary dilatation above and long retention of barium. The walls are perfectly smooth and elastic. It may result in very marked dilatation and tortuosity of the entire oesophagus. One case in my series retained 1500 cc. of fluid for several hours. In the early stages it may be relieved by atropine.

5. Compression stenosis and displacements—These may be produced by aneurysm, mediastinal tumors, vertebral disease, cardiac enlargement or aortitis. Thorough examination with the roentgen ray will differentiate all these conditions.

6. Diverticula—These are of two kinds, dependent on the cause, pressure and traction diverticula. The pressure or pulsion type is due to increased pressure within the tube and results in a hernia of the wall. Traction diverticula are due to distortion of the wall from outside influence. The latter type are rare and usually cause no symptoms. The pressure type usually occurs just below the junction of the pharynx and oesophagus, and are generally on the posterior wall, where the musculature is deficient. When the sac is filled it causes pressure on the oesophageal wall and makes swallowing difficult. It is seen on the plates as a distinct pouch, more or less olive shaped,

with its opening always at the top. Often a fluid level may be made out. In the act of swallowing, the pouch is seen to contract and eject some of its contents through the opening at the top. They vary from the size of a pea to a large pear.

Other Conditions

7. Fistulae of the oesophagus are usually due to carcinoma but may result from an adjacent tuberculous process breaking through or from a destructive syphilitic condition. We will show such a tubercular process connecting the upper left lobe with the oesophagus.

Foreign Bodies—If not opaque they can be localized by their interfering with the passage of the barium mixture. Very often enough barium adheres to them to outline their structure.

Syphilis—Is seen in two forms, (1) a gummatous condition of the sub-mucosa and degeneration with ulcer, scar and stenosis, (2) a diffuse process encircling entire lumen for several inches with points of partial stenosis. Is much similar on the plate to carcinoma but lacks the characteristics of the latter. In case of doubt the therapeutic test is the best means of diagnosis. We shall show one proven case.

DR. L. T. LEWALD, New York: I am very much interested in Dr. Butler's paper. There are three points in particular. The first is in regard to cardiospasm. It has been my belief that this is congenital. He mentioned that. We have seen three cases in young children along about eight or ten years of age. There was so much dilatation that it would give you the impression that it must have existed for some time previous, though the symptoms were not very evident until that age, eight or ten. I was very much interested to see his case of syphilis of the oesophagus. That is a thing I have been looking for but I have not had an opportunity to have a proven case. We have one

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case under observation at the present time which may be syphilis of the oesophagus. His case appears to answer all tests and the treatment seems to prove it an 'authentic case.'

DR. G. E. RICHARDS, Toronto, Canada: I enjoyed this paper very much. There are two cases I would like to have much explanation on. I would like to ask Dr. Butler if he would explain to us a little more fully how he tells that he has proven that all the spasm is in the lower end of the oesophagus. The reason I ask this is because it has been my belief that the whole orifice is involved in these cases. We have also believed that more of these cases are reflex spasms or recurrent spasms than has sometimes been considered. In connection with that we have had three cases operated on for duodenal ulcer and one for appendicitis in which the cardiospasm later was entirely relieved. I would like to have more information on that.

The syphilis of the oesophagus is exceptionally interesting. We have one case which gave us an opportunity of observing one of the functions of the bronchus. It was a persistent bronchial fistula due to syphilitic ulceration in which we found the bismuth in both bronchi. I had that patient standing almost on his head for one-half hour to observe whether any drainage occurred out of the bronchus. At the end of one-half hour no drainage occurred and yet when we sent him back to bed he was able to empty the bronchus by the natural effort of coughing.

DR. W. H. STEWART, New York: I have had experience with quite a number of cases of tracheo-oesophageal fistulae, some of the patients retaining the barium or bismuth for a considerable length of time, without any undue discomfort or harmful developments.

We have recently had three cases of malignancy of the oesophagus, high up, involving the epiglottis, in which there was not a perfect closure of the epiglottis. In all three we noted a fistula in some of the branches of the bronchi, the opaque substance being expectorated in each case.

DR. HARRY A. BOWING, Rochester, Minn.: I would like to add another group of cases that are considered inflammatory. I do not know how many we have collected. These

are the cases of stenosis following the pernicious vomiting of pregnancy. Just how it happens of course we do not know, but we feel it is due to some break in the mucous membrane of the oesophagus and lower lining by the gastric juice, and later infection, but we found the whole oesophagus much thickened and in some cases it was difficult to get a fine silk thread through. We are able after a while to split a very fine thread and get it through and later we are able to pass a fish line and a little later on it will be dilated.

DR. GEORGE C. CHENE, Detroit, Mich.: I would like to say one word. Dr. Stewart has had a great deal of experience in filling the bronchiectasis, which would lead one to think there is no danger in these cases. I want to report a case of an elderly woman, quite emaciated, who promptly died in the x-ray room when we attempted to give the bismuth.

DR. P. F. BUTLER, Boston, Mass.: (closing discussion): As to the differential diagnosis, I do not believe it can be made by the x-ray between carcinoma and syphilis. In the case in which we made the diagnosis we suspected it because it was not a typical picture of carcinoma. We suggested a Wasserman, and the presence of syphilis was proven by the positive Wasserman and the therapeutic test.

As to spasm occurring at the diaphragm or at the cardia, this was suggested originally to us by Dr. Mosher, who has done so much work on the oesophagus. Following that suggestion we have followed all our oesophageal cases with this point in view. In nearly all our cases the spasm occurred in the oesophagus where it passed through the diaphragm and behind the liver. At the Harvard Medical School Dr. Mosher has a wonderful collection of casts of the oesophagus which he will show to any one who is interested. He has a number of infants with this condition, proving it may be congenital. He has a large number of adult specimens. In all his specimens he has shown that the obstruction occurs at the oesophagus where it passes through the diaphragm. We are satisfied that is where the spasm occurs, both from his data and from the later observations we have made.

*—Read at mid-year meeting of The Radiological Society of North America, held at Boston, June 3 and 4, 1921.

A Retrospective Note Concerning Treatment of Tonsilitis by X-Ray

H. W. VAN ALLEN, M. D.

Springfield, Mass.

RECOGNITION of the varying action of x-rays upon different tissues is the foundation of modern x-ray therapy. Rays of the same character striking a variety of cells produce in each cell effects peculiar to itself. As a rule, the more embryonic the cell the more readily is it destroyed by radiation. The lymphoid tissue of the tonsil is extremely easily effected and thus our ability to treat through the skin and muscle without effect while the more distant lymphoid tonsil undergoes retrogression.

W. D. Witherbee, reading a paper before a body of roentgenologists in New York last December, showed the results upon sixty experimental cases of enlarged tonsils treated by x-ray. Extremely careful records were kept; drawings and photographs made. The results seemed excellent and in selected cases it would be a treatment of choice. His closing paragraph was:

"It must be understood that this paper is only suggestive and that the permanency of the results only time alone will determine."

It occurred to me the effect of such treatment could be proven by work already done sometime in the past. During the past fifteen years many of us have treated large numbers of cases of cervical adenitis. The relation of tonsillar infection to cervical adenitis need not be dwelt upon in this paper, but simply recognized. A study of such cases with reference to the tonsillar condition

would be of help and it is for this reason I come before you with this note.

Fifty cases were selected that had been treated more than three years ago; cases were taken that had a history of repeated tonsilitis with chronic enlargement previous to the cervical adenitis for which the treatment was applied. The results of this investigation were very emphatic in showing the beneficial effect upon the tonsils. About 80 per cent of those so investigated had never had another attack and the tonsil had ceased to be an annoyance. They all agreed that the tonsil had been greatly reduced in size. Those having tonsilitis after treatment were acute inflammations with no chronic irritation, as seen previously.

The method of treatment, by chance, corresponds quite closely to that recommended by Witherbee. It has always been fractional and extends away back to the time of the static machine. The dose, however, varied. It was probably much less in those early days when methods of exact measurements were not known. As instruments of precision came to our use I finally came to use 8-inch spark gap, 3mm. aluminum filter, $3\frac{1}{2}$ M. A., 16-inch distance, 20 minutes time. Repeat once a week for about six weeks.

In the study of my cases, I believe a larger proportion of those in the early days showed a permanent cure than the later ones who had more active treatment.

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It did not seem practical to inquire about the adenoids as no record was kept of the original condition and the patient's statement might not be reliable.

There seemed to be no permanent effect upon the salivary glands although, as you all know diminished secretion of these glands is noted temporarily by many patients under x-ray treatment of the region under discussion.

In my own cases I have never seen resulting telangiectasis or skin atrophy although I have noted this condition in patients who had received more vigorous radiation.

The foregoing is only a note in regard to tonsillar treatment by x-ray but I believe the deductions, which can probably be duplicated by many men of long experience in radiotherapy, are good and should have a bearing on our present attitude toward this method of treatment.

DR. O. H. McCANDLESS, Kansas City, Mo.: The problem brought out by Dr. Van Allen with regard to

treatment of the tonsils is one that we have encountered in our work. So far we have sixty patients treated by this method. The unfortunate part is that we so seldom get tonsil tissue for radiation. There is not enough data in our laboratory to present this method. The retrogression of the tonsil is something we are familiar with. Those of you who have done nose and throat work can give us data that we as roentgenologists cannot give.

The technique used in regard to tonsil culture has been to place a culture from the right tonsil on one side and one from the left on the other, following a definite technique in each individual case. I think many of us are going to make the mistake of taking our tonsillar cultures too soon. I am not going to say whether our tonsillar cultures are going to be valuable. It is possible that some data will be obtained by sterilization of the throat. Second cultures we have not attempted to take until six or eight weeks after the last treatment. We give three treatments of 25 ma. minutes at a distance of 8 to 12 inches. We have had a good many children and a good many adults. I would like to wait a sufficient time after the treatment to get the final findings. I would ask that our results be not taken too soon after the treatment is given.

held at Boston, June 3 and 4, 1921.

*—Read at mid-year meeting of The Radiological Society of North America,



The Value of Radium and X-Ray Therapy in Hodgkin's Disease

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THE symptoms and course of Hodgkin's disease may be modified favorably by the application of radium and deep x-ray therapy. Many patients with Hodgkin's disease have been successfully treated at the Mayo Clinic with the technique described in this paper. The primary result is of foremost importance in this discussion, since there is not time to present details with regard to the after-result. Reduction in local and distant glandular masses and general systemic improvement are noted in practically all cases, and it is reasonable to conclude that the expectation of life has been increased.

Hodgkin's disease is an infectious granulomatous process involving the lymphadenoid tissue of the body with early enlargement of the cervical glands. The superficial and deep lymphatic enlargements are gradual, progressive, and painless, and produce anemia or are associated with it, hepatauxe, and splenomegaly with or without fever. Death may occur in a few months or the disease may extend over a period of several years.

Etiology

Although the specific etiology of the disease is not known, Trousseau, and Bunting and Yates have demonstrated that focal infection plays a definite part. The origin of the infection may be tonsillar, dental, or in the accessory sinuses. The patient usually volunteers the information that

the glandular enlargement followed an attack of influenza, a "head cold", and so forth.

Hodgkin's disease is widespread in the United States and in Europe. There is no special geographic distribution and no race immunity. In a group of 122 cases Bunting has shown that males are twice as susceptible as females. Although it is a disease of youth and early adult life, it may attack persons of any age. With a careful technique diphtheroids may be cultured from the glands. Negri and Mieremet, Bunting and Yates, and Rosenow have isolated these organisms. Inherited tendencies or direct contagion cannot be proved.

Pathology

There is a gradual enlargement of the superficial and deep glands and of many organs containing lymphoid foci. The primary lesion is usually in the cervical glands with extension to the axillary glands on the same side. The opposite cervical, axillary, and inguinal groups of glands are then attacked. Many of the lymphoid foci of the body may also enlarge. The primary lesion may appear in the gastro-intestinal lymphoid apparatus or in the spleen. The glands are encapsulated. They do not metastasize or show any vegetative characteristic, although they have the malignant characteristic of recurring after operation or radium and x-ray treatments.

The glands do not become so enlarged as those seen in cases of

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lymphocytic leukemia. They are spherical or oval in form and are never fused. The enlargements remain discrete, but may be intimately bound together by a chronic periadenitis, the end process resembling a huge mass. The consistency of the glands varies. The cellular hyperplasia, characteristic of the early stage, shows the glands to be soft but not so medullary as those of leukemia. In the late stage, due to fibrous changes, they become firm and hard.

The predominance of lymphocytic proliferation in the microscopic picture has led most observers to conclude that the process is inflammatory, the result of some irritant. The glandular enlargement, however, may be the result and not the cause of the disease.

The proliferation of the reticulo-endothelial cells and fibroblasts is the most characteristic change in the process. The gland's architecture is lost early. The stimulation is soon followed by a destructive reaction, reducing the number of the lymphocytes in the glands and, as Bunting and Yates have pointed out, in the blood stream. Diffuse sclerosis occurs as a fibroblastic change in the glands, but does not attack the capsule as in nonspecific chronic lymphadenitis.

The most important single feature in the microscopic pathology is the atypical proliferation of endothelial cells leading to giant cell formation. The cells are present in all cases but vary in number. If the lesions progress, sclerosis increases and the gland is gradually replaced by dense fibrous tissue.

Blackford's summary is similar to that of Dorothy Ried; proliferation of large endothelioid cells;

production of numerous multinucleated giant cells; progressive fibrosis, and abundance of eosinophilic cells.

Symptoms

For therapeutic purposes the cases may be divided into two groups; the acute and the chronic. The acute condition is characterized by very rapid progression of all the features of the disease and is usually associated with intermittent fever. If fever is present, it is moderate, whether or not the glandular enlargement is marked, and lasts for from ten to fifteen days. Glandular swelling is usually the first sign, although recently the patient may not have felt as well as usual. Malaise and weakness are more or less constant. Periods of increase in glandular swelling alternate with periods of remission and the patient usually feels improved. The glandular swelling is painless, beginning in the cervical group with extension to the axillary, inguinal, and later to the mediastinal or abdominal lymphatics. One or more cervical glands on one side of the neck are usually affected first; later the growth extends in the same group and then into the opposite cervical group.

Many clinicians believe that superficial glandular enlargement is associated with a similar enlargement of all the lymphoid foci, including the lungs, spleen, and liver. Anemia is usually moderate and steadily progressive, although seldom extreme. The huge glandular enlargements may produce edema, and difficult motion of the head, arms, and legs. An intense generalized pruritus may be present. The acute condition seldom becomes chronic; it extends over a period of a few months, terminating in death.

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Chronic Hodgkin's disease is similar to the acute condition except that it varies in intensity and duration. Pressure symptoms from involvement of the deeper group of lymphatics occurs usually in the late stage. The bronchial and mediastinal glandular enlargements cause an irritative productive cough, pains in the chest, intense dyspnea, dysphagia and cardiac embarrassment, with enlargement of the superficial veins of the anterior chest wall.

The abdominal enlargement may be primary and associated with jaundice and edema. The pain is usually a dull ache in the lumbar region, occasionally across the lower abdomen, and may be referred down the legs. The anemia increases steadily, although remissions are common. Malnutrition may be present. Fever, which is variable, is usually moderate and resembles that of pulmonary tuberculosis. The disease is usually a termination of intercurrent infection, acute tuberculosis, anemia, and so forth, or of a general decline resembling toxemia. There are many variations in these groups, the controlling features of which are unknown. The portal of entry and personal resistance probably play an important part. Many cutaneous lesions resembling inflammatory processes have been reported and described as definite nodules of Hodgkin's type and similar to the nodules of leukemia. The pruritus is usually generalized, intolerable, and resistant to ordinary treatment. The blood changes are not constant.

Differential Diagnosis

Hodgkin's disease, lymphosarcoma, tuberculous adenitis, and pseudoleukemia have certain symptoms and signs in common, although each has a distinct clin-

ical course, and pathologic picture. The differential clinical diagnosis in early Hodgkin's disease, lymphosarcoma, and tuberculous adenitis is difficult and almost impossible. The blood picture of leukemia gives a clue to this condition. The process in Hodgkin's disease is slower than in sarcoma and usually occurs before the age of 35. In early cases of lymphosarcoma a differential diagnosis is impossible, although the condition usually occurs after the age of 35. Extraglandular infiltration of the surrounding tissue with fixation of the mass is usually present. Tuberculous adenitis is considered a disease of youth. Diagnosis in the early cases is very difficult, although, if the condition progresses, there may be an associated extensive softening and caseation.

In pseudoleukemia the glandular enlargements are more widespread and are usually soft and medullary. The blood picture serves as a basis for the diagnosis. Radical surgical treatment of Hodgkin's disease may be considered, although an isolated gland should be excised and submitted to pathologic examination.

Prognosis

In untreated cases of Hodgkin's disease, the acute condition is fatal within a few months, while the chronic phase may endure for from two to five years. The condition is uniformly progressive with latent periods and an associated feeling of good health. There are no reported cases of spontaneous recoveries.

Radium Technique

One thousand milligram hours of radium are delivered to areas of skin each 3 cm. by 4 cm. covering the involved glands. The number of areas is dependent on the amount of involvement. Fifty

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or 100 milligram doses of radium salt or emanation are contained either in a universal tube applicator, with silver walls 0.5 mm. thick, or in a brass capsule of equal density. The radium is maintained 2.5 cm. from the skin, being filtered through the wall of the applicator and 2 mm. of lead. The duration of radiation is twenty and ten hours, respectively, for the silver and brass applicators. To maintain distance, gauze or wood (Balza) has been used. This wood has been used satisfactorily at the Mayo Clinic for the past two years, as it is light, soft, and inexpensive. A disk of lead 3 cm. by 4 cm. and 2 mm. thick is placed on the top of the radium applicator to complete the package. Adhesive plaster is used to strap the parts of the block together and to fix it to the patient.

If the top surface of the applicator should come within 2 cm. or 3 cm. of the adjacent skin surface, it is thoroughly protected with a sheet of lead 1 mm. thick. Interposed between the lead and the surface of the skin is a sheet of rubber 1 mm. thick which absorbs the soft secondaries from the lead sheet; this extends 1 cm. beyond the edges of the sheet of lead (Fig. 1).

Treatment

From 5,000 to 6,000 'mg. hours of radium are applied to each right and left cervical and to supraclavicular areas, from 2,000 to 3,000 to the infraclavicular and inguinal areas, and from 1,000 to 3,000 to the axillary areas. Any palpable abdominal glandular enlargement is blocked off in a manner similar to that described for the cervical area. Mild reactions such as malaise, anorexia, nausea, and occasional vomiting, are usually disregarded; severe reactions are

avoided. Should a severe reaction occur, the radium treatment is usually abandoned for a period of from two to three days or until the patient returns to a satisfactory condition. The fluid intake and elimination are usually encouraged and soda bicarbonate is given in dram doses three times a day.

Two to four areas are usually radiated at one time with an interval of two or three days between treatments. A mild or intense erythema may occur after the last application or two or three weeks later. It yields readily to ordinary treatment and lasts for from three to ten days. The part should be kept dry and dusted freely with a good grade of bland impalpable dusting powder. No secondary skin changes are noted, although the natural skin pigments may be increased; this does not necessarily follow an erythema.

X-Ray Technique

Formerly many patients with Hodgkin's disease at the Mayo Clinic were treated by the formula as follows: A broad focus Coolidge tube, a 23.7 cm. parallel spark gap, skin target 22.8 cm. distance, time six and one-half minutes, 5 ma. of current, filtration 3 cm. of aluminum, and a piece of sole leather. Multiple portals of entry varying in size were used. Treatments were repeated at intervals of three weeks until a series of six or eight had been given. In our present formula the distance has been increased to 30.5 cm. from the skin, time twelve minutes, filtration 6 mm. of aluminum, and a piece of sole leather. The number of portals of entry is limited. One area of both the right and left cervical regions is exposed. The chest is equally spaced in four squares;

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the size of the opening depends on the size of the chest wall. One area in both the right and left axilla and one area both in the right and left inguinal glands are exposed. The back is divided into eight areas. The upper and lower limits are marked, respectively, by transverse lines at the level of the seventh cervical vertebra and gluteal fold of the buttock. Treatments are repeated every three weeks until a series of six or eight have been given; an interval of three months is allowed to determine whether or not further therapy is indicated.

The x-ray treatments are usually given at the beginning or at the end of the radium exposures. Irradiation of the anterior abdominal wall is avoided, since it may result in very severe reactions, which resemble peritonitis, with marked distention of the abdomen and ileus, associated with abdominal pain. There are frequent foul smelling, greenish stools. Convalescence extends over a period of six to ten weeks. Mild reactions similar to those following radium applications may occur from x-ray exposures of the chest and back.

The two great body cavities and all possible superficial glandular enlargements should be treated with the x-ray at the onset of the disease in order to ward off the impending mediastinal and abdominal enlargements, if possible. The initial good results of radium and x-ray therapy may be due to the direct destructive effects on the glandular enlargements characteristically composed of an abundance of nuclear substance, lymphoid elements, endothelial cells, and so forth. The large glandular endothelial cells are very susceptible to radia-

tion. Fibrosis, which is nature's method of recovery, is set up by radium and the x-ray.

Treatment should be instituted as soon as possible. The anemia should be treated with the ordinary therapeutic agents and all possible foci of infection removed. If the anemia is steadily progressive, radium and x-ray treatments should not be given too intensively because of the destructive effect of irradiation. Vaccine and serums are of doubtful value.

Conclusions

In early cases of glandular enlargement, an isolated gland should be removed for examination by a pathologist. The life expectancy of the patient should be increased by intensive radium treatment of the superficial glandular enlargements and deep x-ray therapy of the thoracic and abdominal cavities whether or not the roentgenograms are positive. Huge glandular enlargement and mediastinal involvement are markedly diminished. The generalized pruritus may diminish and in some cases may entirely disappear.

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*—Read at mid-year meeting of The Radiological Society of North America, held at Boston, June 3 and 4, 1921.

Radiation in the Treatment of Leukemia

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THE average medical practitioner, whether engaged in general medical work or in the practice of any other specialty besides that of pure radiology, has neither the time nor the opportunity to keep informed concerning the various intricate steps and changes that have followed the development of radiotherapy. This accounts in no small measure for the opinion frequently expressed that radiation is unsuited for general therapy. A comparatively few broad-visioned medical men, who have laboriously followed the development of this science, and who by their carefully weighed experimental researches have begun to tabulate their findings, have become convinced that radiation is a force capable of ascertaining a profound influence on human tissues and that this influence can be brought to bear upon pathologic processes in a manner that so far has not been approached by any other remedial agent. To these men it is apparent that radiation has possibilities that are practically unlimited. This does not mean that our present day conception of radioactivity and radiotherapy will not undergo revolutionary changes, the future evolution of which we are as yet wholly unable to foretell.

After reviewing the different therapeutic measures introduced and used in the past decade to combat the various types of leukemia, the writer is convinced that radiation in the form of x-rays and radium has proved it-

self to be the most serviceable from a symptomatic standpoint. From a curative standpoint, it does not appear that we have, so far, any permanent foundation upon which to lay definite claims. Yet it must be remembered that we are still in the primary class in dealing with radiation. Although x-ray apparatus is now used in every civilized community, very little of the work can be considered as having passed the experimental stage.

The two distinct types of leukemia with which we are familiar are the splenomedullary or myelogenous, and the lymphatic. Not infrequently a combination of these types may be seen. In the writer's own experience the myelogenous type has outnumbered the lymphatic variety two to one. In the days before blood examinations became a routine measure, these patients were subjected to x-ray in an altogether unscientific and empirical manner. If the rays were of the proper quality to affect the blood forming organs, the symptomatology of the case under treatment would rapidly change. If the rays were not the proper kind, naturally no results were obtained. In more recent years, as the result of a wider knowledge of radioactivity, and a better realization of the value of frequent blood examinations, a more orderly technique was obtained, and radiation began to show more definite results. By the changes in the blood picture, we began to understand the rationale of exposing the bone mar-

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row of the extremities in certain cases, and the spleen and lymphatic gland areas in other cases, until today we have a well regulated and fairly scientific basis for our work.

The technique varies necessarily with the symptomatology of every case. Our aim, of course, is to diminish as rapidly as possible the pathologic activity of an accentuated leukocyte total. It is of the utmost importance, however, in accomplishing this end to watch the behavior of the red blood corpuscles and the hemoglobin. Radiation can easily be carried to the point of a destruction of the red corpuscles and a lowering of the hemoglobin percentage, doing the patient more injury than the presence of a fairly large white cell body. Proper judgment must be exercised in dealing with such a condition.

It is astonishing to note certain instances in which a spleen large enough to fill the entire abdominal cavity has been reduced within two or three weeks time to a normal size. It is, in such cases especially, that the most careful watch must be kept over the condition to avoid a serious toxemia. Again, in some cases of the Hodgkin's type, glands of enormous size that are visible to the point of distorting the features of the individual, may disappear in a most remarkable manner. It is no uncommon occurrence to have mesentery glands of enormous size and cervical glands correspondingly large melt away with almost unbelievable rapidity.

In the face of such ocular evidence of the action of radiation, it would seem an easy matter to predict an early cure of these cases. Unfortunately, the test of time has shown us that these im-

mediate results are neither permanent nor curative, that in spite of subsequent radiation, there is a gradual enlargement of the affected organs and glands, and that eventually there comes a time when radiation fails in every way to prevent a fatal termination. A recent case will serve as an illustration. This was one of the Hodgkin's type that showed a marked reduction of glands under a course of radiation, with an improved blood picture. The improvement was so satisfactory that we felt that we were justified in a hopeful outlook. The patient returned in three months with no enlargement of the glands but with a typical malignant appearance, which showed no improvement in spite of additional radiation and careful supplemental treatment, and the patient rapidly succumbed.

This does not mean, however, that we have reached the end in the development of our resources. In the past ten years, there have occurred in the writer's own practice a number of striking illustrations of beneficial results that would justify a most hopeful attitude. We have one male patient, of fifty-five, who comes from the East every winter and is under radiation in our office for two months every season. Five years ago his white blood count was sixty thousand leukocytes, red blood cells four million; his muscular tone was poor, but he was well nourished. During the first two years, his white count ran down to thirty thousand, his red count was about four million five hundred thousand, his general condition was static. In the past two years, his white count ran between twenty and twenty-five thousand, his red count a little over four million five hundred

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thousand. His muscular tone is somewhat better, his general condition more alert, and he maintains an even weight. His condition is on the whole considerably better than it was five years ago. We have another patient, a woman about forty-five, who had a leukocyte count of two hundred thousand. This patient was re-examined in the first part of the present year, and found with a leukocyte of eighty thousand and a chain of symptoms of alarming significance. This time the x-ray was employed, and in a few weeks the white count was down to ten thousand with a normal red count and the patient seems at present in good health. If we continue in the next ten years to make the same progress as in the past ten, there can be no question, at least in the mind of the writer, that we shall eventually find a solution of many present difficult problems.

One phase of the subject that is of importance is the possible correlation between lymphatic leukemia and adenosarcoma. In some of these conditions, the blood picture may be so atypical as to challenge the best diagnostic skill. It has seemed to the writer that a case that at the outset is diagnosed as a typical Hodgkin's disease may develop rapidly into a case bearing every clinical resemblance to a sarcoma of gross malignancy. Age seems to have considerable bearing on the effect of radiation. The earlier in life leukemia develops, the more rapidly fatal it appears to be. In patients of advanced years, it seems that radiation maintains a retarding influence on the progress of the disease, better than in younger individuals.

The effects of radiation from x-rays and radium are apparently

alike. If radium is used, a sufficient amount must be employed to insure deep effects. The writer frequently employs radium over the spleen, and x-radiation over the osseous structures and glandular fields. The writer has one woman patient, with whom he has been in personal touch for eight years, in whose case the blood pathology has been held in check by periodic courses of radiation. It is difficult to lay down any stringent rules. Much depends upon the blood condition in determining whether to make a rapid attack over every available area and quickly get the condition under control, with a possible danger of lowering the patient's resistance, or to take the more conservative method of a gradual destruction of the pathological processes by a more graduated and a smaller radiation amount.

The technique for radium over the spleen that we ordinarily employ is as follows: The area is divided off into squares, eight centimeters in diameter. One hundred milligrams radium element, with one-half millimeter of silver, one millimeter brass, and two millimeters hard rubber filter, are placed in a wooden block, the whole wrapped in gauze, making a skin distance of three centimeters when applied. A total of fifteen hundred milligram hours is applied to each of the eight centimeter squares. At the end of this series, a blood count is made, and upon the findings thus obtained, additional treatment is regulated to suit the individual patient. We have not found it necessary to use radium over the bones.

The technique for the x-ray to the spleen, making use of the same eight centimeter squares, is as follows: Each area receives fifty milliamperes minutes accord-

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ing to this formula: Voltage one hundred thousand with its equivalent ten-inch back up, aluminum filter four millimeters thick, cotton pad one-half inch thick, five milliamperes on tube circuit, ten minutes time, and eight-inch skin distance. When this series has been completed, the blood picture is analyzed, and the same procedure as with radium is followed.

Over the long bones, the eight centimeter spaces are again followed with a difference in the formula; only three millimeters of aluminum filter are used and seven minutes time given, making a dosage of thirty-five milliamperes minutes. The radiation is administered to as many approachable bone areas as are necessary, all the work being controlled by a blood count. It is of the utmost importance to radiate thoroughly the inguinal and axillary regions, whether or not any palpable gland chains are present.

In leukemia as in other conditions, no machine made rules can apply. It is extremely important to view the patient from every clinical angle, and make use of radiation in a manner that will best serve the conditions under treatment. It is my rule to discuss the condition quite frankly with the patient, and to prepare him for periodic courses of treatment. It is, of course, not necessary to dilate unnecessarily upon the temporary benefits of the treatment, for there may ensue a better end result than we anticipate from past experience.

It does not seem unreasonable to assume that when we shall have become more familiar with the currents of high tension that will soon be supplied to the radiologist, a more exact method and dosage will be produced, which will enable us to be more specific

in our therapeutic treatment of leukemia cases.

DR. TRUMAN ABBE, Washington, D. C.: I would like to ask Dr. Soiland whether he has had any opportunity to compare the results he has obtained in these leukemia cases with the reports of one or two cases reported by Dr. De Grais, of Paris, in radium treatment after splenectomy. A patient with leukemia on whom splenectomy had been done was subsequently treated with radium over the splenic area just as though the spleen were still present. The results after the treatment in those one or two cases were the same blood changes as were found in patients similarly treated when the spleen had not been removed. We recognize that there were two factors in common that might have modified the blood pictures: One the irregular changes in the course of the disease and the other the radiation of the bone marrow of the ribs or possibly of some other tissue. I would like to ask whether Dr. Soiland could help us interpret the results in these cases of radiation after splenectomy.

Another question in connection with the size of the area treated as compared with the physiologic effect. Dr. Howard of the Radium Institute of London has repeatedly made the comment that the physiological effect is dependent not only on the strength of the applicator but also on its surface area. For example the reaction after the use of a half strength applicator for one hour over six square centimeters is practically equal to that from a quarter strength applicator for one hour over sixteen square centimeters whereas we should expect but half the effect in the larger area since the milligram hours are only one-half those in the smaller area. If this is corroborated there may be a marked modification of dosage calculation for all large areas. I wonder whether Dr. Soiland has had a chance to take up the question of comparative effect of the size of area and the physiologic effect?

DR. GEORGE E. PFAHLER, Philadelphia: This is a very interesting subject. I would like to ask a few questions. I would like to ask Dr. Bowing how long his longest patient has remained well; how soon he has found recurrence; what has he done for the recurrence? We have all gone through the experience of get-

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ting the most beautiful results in Hodgkin's disease and leukemia and sooner or later meeting with as equally disappointing results and failures from any effect of radiation. I think every one of us has seen great masses of Hodgkin's diseases disappear completely as far as we can tell from palpation or from x-ray examination and yet we get recurrences and the patient ultimately dies. Generally, it seems to me, they die in about three years. I have one patient who is alive and apparently well at the end of eight years. That is the longest I have seen. Dr. Holtz, of Grand Rapids, showed a case at the Chicago meeting six years ago that had been well eight years. That was the longest case that anybody within conversation distance had known of to be permanently well.

Now the question comes up, how can we get rid of these great masses of malignant tissue and how are we to prevent them from coming back; how are we going to get the patient completely well? What observations are you making or what shall you use to guide you in making the exposures? We cannot go on treating a patient forever just because he has had Hodgkin's disease. When should we stop and when should we begin again? How shall we answer that? Is there anybody who can answer that? I have these patients come back when they are well at least once in three months for careful observation. If there is the slightest sign of recurrence I treat them and treat them very actively. I think we should not confine our treatment to the areas we can palpate but should go beyond that. I have had a few cases in which I got rid of everything in the axilla and chest and at the time I was treating the patient I could not find anything in the abdomen and later the patient would turn up with a metastasis in the abdomen and would die. Just last week I saw a patient who was treated a year ago with large doses of x-ray and at the same time the internist used Coley's serum. It seemed foolish to add any devitalizing effect to the blood by using x-ray, so we stopped the x-ray. Later the patient was sent to the surgical department of another hospital for the removal of a large kidney. The surgeon recognized this as a part of the Hodgkin's disease and sent him to the x-ray department of that particular hospital. That patient came in

the other day nearly well as a result of the x-ray treatment. You could not feel the abdominal glands. Most of these cases are very well nourished and abdominal masses are hard to palpate.

These same remarks can apply just as well to the leukemias. As to when we shall stop treatment, and when we shall begin treatment again. In treating the spleen I have not been able to see why there should be any reasonable advantage of radium over x-ray. Personally I divide the spleen into three areas, front, back and side, and in that way I am getting as much cross-fire effect as possible. I have treated quite a number of myelogenous leukemias in that way. Theoretically I think it is correct to treat the long bones, but I have not seen any better results than when the spleen alone is treated.

DR. L. A. SANTE, St. Louis, Mo.: I would like to ask Dr. Soiland whether he had any result in treating leukemias with intravenous injections of radium solid deposit? Three years ago at the Atlantic City meeting I heard Dr. Janeway give a discussion on three cases treated in that way. In the three cases the blood picture returned to normal and has remained so. One case had been well one year and the other two years. At the time it seemed to me that this was the nearest approach to a cure that had been attained in any other manner.

DR. BYRON C. DARLING, New York City: In regard to the treatment of leukemia, I had a case of myelogenous leukemia which I would like to report. This man came to Bellevue Hospital in 1910 with 73,600 white cells and 31 per cent myelocytes in the blood. That was in 1910 after Pancoast and Stengel published their work on this subject. Following them I treated him over the long bones and got no result, but after I treated him over his spleen I got so much response that I stopped the treatment for a time. His improvement kept on with treatments, guided by blood counts from time to time.

In the next year he had his abscessed teeth extracted and an occasional treatment until his white cells at the end of the year went down to 12,000 and myelocytes to 1 per cent and nothing after several examinations over several months. Then when he began to complain of

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a staggering gait I sent him to a neurologist who found that he had a 4 plus Wasserman and treated him with salvarsan.

During the treatments his large spleen receded gradually from low in the abdomen to beneath the costal region. I instructed him to keep in touch with me and he did so for some years, taking an occasional treatment as his myelocytes showed a tendency to increase, each treatment being followed by improvement until in 1920 I heard that he had died with no cause given. He had lived over 10 years after the diagnosis was made and had had several years of previous history besides. I feel that since he was an intelligent man, if he had suspected a recurrence, he would have come to see me. He may have died from some other disease. At least he symptomatically recovered and lived ten years, showing at times a normal blood count, always directly the result of treatment. There was nothing to indicate remissions of the disease independent of the x-ray treatment.

DR. G. W. HOLMES, Boston, Mass.: I did not hear Dr. Bowing's paper, so I cannot discuss it. I am very much interested in the subject, however. We had an opportunity to observe quite a number of cases over a considerable period of time. We have also seen a few cases in which radium was employed. As Dr. Pfahler said, there are no permanent cures. About four years ago the reports from the Huntington Hospital of cases in which radium was applied over the spleen was published. At present they are using x-ray as well as radium. They feel they are getting better relief and some of them stay well for a number of years under constant observation. When we began to treat these cases we rayed just the visible glands. The glands disappeared rapidly and then would come back in some other place. Later we rayed the chest in addition and prevented the accumulation of fluid. Our early cases died with fluid in the chest. When we began to ray the chest this did not occur, but they died with fluid in the abdomen, and, when we rayed the abdomen they died with no fluid. They died anyway. I believe as soon as we get a case we should ray all the glandular distribution in the body. Let them come back every three months for observation. When you see signs of recurrence, ray them again and do not be content with

raying just the glands in the neck. We have found it of some value to have the blood examined. The character of the blood has helped us some in determining how far we can go with the treatment. I think any one who has done much deep therapy has noted changes in the white count. When the white count goes down to 3,000 it is time to stop and when the mononuclear lymphocytes are increasing it is a good idea to start again even though you do not see any glands. I have seen a case gradually losing ground without glandular enlargement in the chest or elsewhere. You notice as they come into the office that they have no "pep," they act sleepy. When you see these changes you know it is about over. One fellow who acted in this way was given a blood transfusion and he is alive today, but I think he is getting into the same stage again. I do not know whether or not blood transfusions do any good.

I never have any particular help from raying the long bones either in Hodgkin's disease or in leukemia. I think if you are going to ray the long bones you had better use radium. With the penetration we can use I have an idea that we do not knock out the bone marrow very much. I do not think it is necessary to get any burns. Our Hodgkin cases respond very rapidly.

DR. G. E. RICHARDS, Toronto, Canada: I would like to ask Dr. Bowing if he has felt that there is any real advantage in having circulating in the blood stream any of the metallic or other substances which are supposed to produce secondary rays at the time of radiation either by radium or x-ray. We ran a series of parallel cases some three years on the splenic medullary type and we thought we got better results when arsenic was circulating in the blood during the administration of the treatment, where the treatment was being done by x-ray. I would like to know if there is any other information and if it is right or if it is a fallacy?

This subject is one of great interest to me and I hope there will be one or two who might remember that I read a paper before this Society last fall on the subject. At that time we reported the results in twenty-three cases. The oldest living case, I think, is six years. I know we have a case of Hodgkin's disease which has been

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under my care for six years and we have several which have been under constant observation for periods over four years and a fair number running down from that to the more immediate present. While we believe that these people are cured, I think we can say, and I think we ought to say to the profession in general that there is no other known means of therapeutic handling of these cases that is so satisfactory or offers so much to the patient. It may be a symptomatic cure, but if I were up against Hodgkin's disease or splenic leukemia, I would look upon that extra five years as being something of very great value to me.

DR. HARRY H. BOWING, Rochester, Minn. (closing his part of the discussion): Dr. Holmes summarizes the situation and probably has answered many of Dr. Pfahler's questions. Several years ago when radium was applied for this condition at the Clinic, very small doses were given. For example, fifty milligrams of radium sulphate were applied and left in position for from two to four hours, and with this small amount of treatment, favorable results were obtained, but remissions and chest and abdominal glandular enlargements occurred. X-ray treatment of the large body cavities was not considered at all. At this time we anticipate that with intensive radium and x-ray treatments from the very beginning in spite of negative x-ray plates, and negative physical examinations, except for the superficial glandular enlargements, we hope to accomplish more lasting results. In this way we are treating as Dr. Holmes pointed out, all the lymphoid tissues of the body, because there is a great chance that the superficial glandular enlargements are only a local manifestation of a general lymphoid hyperplasia. It has been my privilege to treat cases with intensive general toxic pruritus and as their general condition improved, the pruritus disappeared. We will add months and in some cases years, to their lives by this type of therapy, and markedly advanced cases will be made more comfortable.

Dr. Pfahler asks how long shall he carry on the treatment. Radium should be applied to the superficial glandular enlargements as long as they remain active, treatment being given at intervals of six to eight weeks, and x-ray treatments applied to

the body cavities at intervals of three to four weeks until a series of six or eight of the latter have been given. Then a rest of two or three months to determine if further treatment is indicated.

As to the metallic substances circulating in the blood stream during irradiation treatment with the formation of secondary therapeutic rays, I believe it is physiologically impossible to get metallic particles to remain in the blood stream. They are almost instantly removed by the liver following their introduction into a blood vessel. Kendall has shown that many iodine compounds injected into the blood stream are immediately deposited in the liver. In cases of advanced carcinoma of the stomach, bismuth meals have been given with the hope of producing secondary therapeutic rays, but it has been abandoned.

I am greatly interested in the therapy in cases of leukemia as reported by Dr. Soiland. Our treatment of such cases is a little different. We do not treat any of the long bones with x-ray since we feel that there is little accomplishment as Dr. Holmes pointed out in his discussion. The usual application of fifty milligrams. We are of the opinion that the blood picture of patients treated with radium can be better controlled. Given a case of acute lymphatic or splenomyelogenous leukemia; we usually apply larger doses of radium in an attempt to make the case a chronic type. The usual application in the chronic type is fifty milligrams of radium sulphate or the emanation contained in a universal silver tube applicator wall, 5 millimeters in thickness filtered through two millimeters of lead at 2.5 millimeters distance. In the lymphatic leukemia eight areas are mapped out, selecting the largest lymph glands. The duration of application is three hours to each area. In the splenomyelogenous type the radium is applied in a similar manner and four to six areas are mapped out in the area of the splenic enlargement. The duration of application is from four to six hours each. At the end of four or five days following the treatment, a blood count is made. Should the hemoglobin and red cells diminish in number, the treatment should be stopped for a period of six weeks. Should the white cells alone diminish in number, four applications at weekly intervals are outlined; then a rest of

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six to eight weeks to determine if further therapy should be considered. The usual medicinal remedies are given to combat the anemia. I do not know of another disease that comes under the observation of the radiologist which demands a closer coöperation of radiologist and clinician. The blood picture and general condition of the patient should be passed upon before each application of radium.

Regarding splenectomy in these cases, it has been my privilege to radiate the splenic tumor with marked reduction in size, affording its removal. Dr. W. J. Mayo and Dr. H. Z. Giffin have recently reported these cases.

DR. ALBERT SOILAND, Los Angeles, Cal. (closing his part of the discussion): Unfortunately I was unable to be present for Dr. Bowing's paper. There is today less room for argument between x-ray and radium radiation. It does not make any par-

ticular difference which one you use, provided you supply sufficient energy of radiation from either source. You can use them both together or each one alone. There is just this one difference, that radium is more strictly a local agent. If you want to get a local action over the glands or on the spleen, you can get it a little quicker with radium than with x-ray. I do not lay down a hard and fast technique except in a general way, because you have to treat every case individually. As a rule, we do not get leukemia cases until they have been through the hands of many medical men, and they have ordinarily had every form of treatment. All that remains then is radiation. In regard to the blood examination, this is always necessary. It is more important to maintain a good hemoglobin and red count than to lower the white count beyond a certain point. I have had no experience with post-operative cases of leukemia.

*—Read at mid-year meeting of The Radiological Society of North America, held at Boston, June 3 and 4, 1921.



Determination of Dental Focal Infections by Means of the Radiogram

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THE incentive for this discourse is to correct a very prevalent and almost universally accepted premise, that the radiogram is incontrovertible, *prima facie* evidence of the absence or presence of dental focal infection.

Epochal periods take place in medicine as well as in other fields of endeavor. It is the sincere conviction of the writer, that the appreciation of the potency or the actuality of dental infections as the causative or contributory factors of disease processes, marks a new era of such moment that it is second to no other discovery in the domain of medicine.

Generally speaking, three factors are the chief causes of disease; namely, disturbances of metabolism, trauma and infections. These may exist separately or in various combinations and sequences.

Traumatic conditions give a very evident etiology, but the cause or causes of metabolic or infectious diseases are not so easily recognized.

In 1683 Leeuwenhoek announced the discovery of spermatazoids, yeast cells and certain large bacteria. Plenciz of Vienna, was so favorably impressed with Leeuwenhoek's work that in 1762 he announced the results of his researches, stating that each disease is caused by a special organism, that decomposition is caused by micro-organisms and that bacteria can grow in living tissue.

This, most naturally, was of tremendous importance. Subse-

quently Oliver Wendell Holmes in the year 1843 published his famous essay on the "Contagiousness of Puerperal Fever"; in 1847 Semmelweiss maintained the same theory.

The first definite knowledge of bacteria and their products came from a chemist and not a physician, and dates from the study of fermentation by the illustrious Frenchman, Pasteur.

Before his day, bacteria were known, theories of infections had been elaborated and vaccination practiced, but he definitely established the importance of bacteria in putrefaction, fermentation, and disease, and gave to vaccination a scientific basis.

The views of Pasteur, which were radical departures from accepted belief, inaugurated a bitter controversy, and in that controversy were born the microbic theory of disease, the doctrine of preventive inoculation, antiseptic surgery and serum therapy.

Since then, considerable knowledge has been added to bacteriology, serology and immunology.

Asepsis and antisepsis, for which Lister deserves great commendation, were developed on the predication of infection.

It appears then, that prophylactic medicine was to be and now is, the most auspicious procedure for the preservation of human life and abolition of much illness and discomfort. This formula naturally requires donors and recipients, the latter representing the patients, the former the physicians and dentists.

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Great difficulty is encountered in persuading the acceptance of ideas that appear radical and re-education, which is sometimes slow and tedious is not productive of the results consistent with the exigencies of the ever present end results of invalidism or death.

Medicine is so manifestly empirical, that in the attainment of a diagnosis, conservatism, a postulation, so often used to cover up ignorance and procrastination, is advised and practiced, often terminating seriously.

There are three factors that have a direct bearing on any infective process; firstly, high virulence of the infecting organism; secondly, degree of resistance of the individual, viz: immunity; thirdly, inoculation with an unusually large number of bacteria, which if introduced in large numbers overwhelm the protective elements of the body.

To anticipate eventualities or to practice conservatism the aforementioned factors should be known; however, there is no method, now known, which can be applied to predetermine these factors before extracting the tooth or teeth that might be producing infection.

Unfortunately it often happens that little or no pain exists in the neighborhood of the pathologic teeth and because of this a sense of false security is entertained by the physician, dentist and patient; how fallacious this is, one can readily understand by calling to mind, such diseases as leukemia, pernicious anemia, sarcomata, tuberculosis, etc., where pain is practically absent and still the termination is fatal.

One often hears the argument advanced that the patient does not get well or improve after extraction; the solution of this can be

found by considering the possibility of metastasis, or metabolic disturbances, because of toxin absorption or presence of other sources of infection than dental or a combination of these conditions.

The metastatic action of malignancies is always considered rather gravely, and something to be completely avoided, while metastatic involvements of infectious origin are too often disregarded, with the consequences that convalescence may be retarded, prolonged or wholly unsatisfactory. Furthermore resolution from a disease process depends to a great extent on the nature of the organism and the duration of the illness. It therefore appears reasonable that the earlier a focus of infection is removed the more rapid the convalescence.

The works of Rosenow, Duke, Head, Roose, Dively, Novitsky, Brown and Irons, have definitely established the presence of infection in teeth; their deductions were based on bacteriological, pathological, roentgenological and clinical observations.

Rosenow's work was done in conformity with Koch's law and was ultra scientific; however, it is unfortunate, that much of the practice of medicine is empirical and the end result is the deciding factor in judging values.

Consequently, the writer was impressed by clinical experiences, of the necessity of assisting in disproving of assisting in disproving some accepted notions based on the findings of the radiogram.

The radiogram records variations in densities, these apparent variations should describe bony and dental structures, some of the latter, viz: the peridental space, by indirect signs only.

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Considering the behavior of bone in general, as observed roentgenologically, it appears to be a structure of very limited reaction to pathologic conditions. From this viewpoint, there seem to be only three reactions possible. First, atrophy or diminution of lime content; second, destruction of bone tissue, local or general; third, formative processes, characterized by formation of new bone or a condensation of existing bone around a focus of disease.

At the present time it is quite generally agreed that if a destructive area is observed around a tooth, that tooth should be extracted.

However, we have still under dispute, first, those teeth in which a peri-apical decalcification exists, regardless how minute; second, those areas containing formative bone.

The areas of decalcification have in the writer's experience, been more prolific sources of disseminating disease than those in infective processes attended by osteoplastic formation. The osteoplastic formation is the effort of the local bone structure towards localizing the disease, indicating a good immunizing tendency, and probably suggesting a low virulence of the infecting organism, and also an infection of long standing.

In peri-apical rarefactions the following impressions are perceived: First, relatively acute process; second, possibly a virulent organism, in large numbers; third, poor local resistance. In either case, extraction is advised.

A more contentious matter is, what shall be done with teeth that are well filled and have no roentgenological evidences of pathology? By all means, if the pa-

tient is sick and no other possible source of infection can be found, extract the tooth. This comes under the incongruous head of conservatism. Conservatism, because if we do otherwise, we are open to censure; but, the censure should be placed where it rightfully belongs, that is, on the patients.

Why should they approach the dental profession with foci of infection and expect the resurrection of dead structures?

As medical men we do not attempt to replace diseased organs by new ones, neither do we permit a pus appendix to remain. Why should the super-natural be expected from the dentist?

The lay people must be educated to visit the dentist early and often to prevent organic decay and it is then that the full value of prophylaxis will exist. Heretofore, the dental and medical professions have borne the responsibilities that the patients should have borne and by common accord the patients should be made to feel that the responsibility is wholly theirs.

In some cases the radiogram may reveal a change in the normal appearance of peri-dental space, this may be accompanied by a localized decalcifying or osteoplastic process and need not necessarily be apical. In such cases extraction is again advised. In the acute or fulminating types of infection, the x-ray is quite valueless, unless some antecedent process such as alveolar absorption in the immediate vicinity, is evident, from which reasonable deductions might be made.

With reference to alveolar absorption, a survey should be made as to the depth of absorption, number of tooth areas involved, acuteness and activity. If a single

DENTAL FOCAL INFECTIONS—HUBENY

area is involved, the amount of absorption small and the progress slow, treatment might be tried; however, continued observation is necessary and if the process is progressive, extraction is advisable, to prevent if possible, an extension by continuity of structure.

Of the two processes the closed infective process is generally to be considered more harmful than alveolar absorption.

Conclusions

1. Future of medicine and dentistry lies essentially in prophylaxis.

2. Burden of early treatment should rest on the patient.

3. Coöperation of dental and medical professions in re-educating the lay people.

4. (a) It is inadvisable to devitalize teeth and when that stage is reached, extraction should be advised, although it must be admitted that devitalized teeth are carried by patients, which teeth are not symptom producing. (b) However, these teeth are potentially bad and infection may occur at any time, without any local symptoms becoming manifest.

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*—Read at mid-year meeting of The Radiological Society of North America, held at Boston, June 3 and 4, 1921.



Further Results Obtainable With the Movable Bucky Diaphragm

HOLLIS E. POTTER, M. D.

Chicago, Illinois

GENTLEMEN, when talking with your president, Dr. Tyler, regarding this program I had it in mind that by this time I would have a considerable amount of material on kidney stones, gall stones, pyelography or sinus work to form the basis of a paper of some value. But for various reasons I do not feel that the material so far obtained in these fields is worthy of presentation. I am still using the first home-made apparatus for my work and for some of these special uses much could be wished for in its construction. For instance, in kidney work it is highly desirable that there be some method of immobilization and compression for the best results in detail of kidney outlines. This I have not. For sinus work, my diaphragm, mounted under the table, is too awkward to use. I have become satisfied that there is definite value in sinus and mastoid work, but before using this system in routine I shall have to build special apparatus for this purpose alone.

In walking about your exhibit rooms I see films made through the deep osseous structures that eclipse anything I have obtained, due to the finer grid construction now being furnished by manufacturers. And in talking with the members I have become convinced that most all are so familiar with the theory and practice of roentgenography with the Bucky arrangement that it would be needless procedure for me to dwell on it in a general way. There is one aspect of the work

that I would like to emphasize, however, especially to those who are doing their first work with this diaphragm, and that is the question of dosage.

For the first month I used the diaphragm in conjunction with plain plates. The increased exposure required by this technique resulted in a high tube mortality. The Coolidge radiator type of tube built for thirty milliamperes and used at this maximum, backing up a five-inch parallel gap is not supposed to be used for more than fifteen or eighteen seconds without becoming overheated. Since on an average individual at 25-inch tube-plate distance I was required to extend the exposure to thirty seconds or more the tubes suffered materially. With larger individuals the time under these conditions had to be prolonged still further. With the use of plain plates, therefore, I was obliged to make the exposures in relays of about fifteen seconds each, with ample rest between, often even changing the radiator during the pause. Suppose now that it was desired to make two or three plates in succession using this large discharge with a target-skin distance of about twelve inches. It is obvious that in doing so one approaches, if not surpasses the erythema dose, as has been given us by some investigators. It is in this connection that I would voice a warning which may prevent the enthusiastic repetition of exposures on the same patient.

When I realized that I was demolishing tubes beyond reason

MOVABLE BUCKY DIAPHRAGM—POTTER

and in two heavy exposures running the risk of erythema, I naturally began a double screen-film technique, which has since been followed. By this method one does no harm to the standard radiographic tubes and is at liberty to make a number of plates without risk. Even with the double film-screen method I would advise a thin filter when radiographing sinuses for fear of epilation.

Looking back upon these facts it seems rather fortunate that I got along without an erythema or an epilation, but I am satisfied that the limit was so nearly approached on different occasions without once thinking of the consequences that the best thing I could say here today is to look out sharply for over-exposure of your patient during your first experiments with a Bucky apparatus.

Discussion

LEWIS G. COLE. Dr. Potter is certainly to be most heartily congratulated on his achievement in perfecting the Bucky diaphragm or grid.

It is, I believe, the greatest improvement in x-ray apparatus since the development of the Coolidge tube.

The serious detrimental effect of secondary rays in radiography has been generally recognized.

This Potter Bucky grid does not prevent secondary rays from being generated in the body, but does prevent part of them from reaching the plate or films.

The improvement in the contrast of the plate is so great that it might lead us to be satisfied in preventing only about one half of the secondary rays from reaching the plate.

If a double grid, working at right

angles to each other, were possible the contrast would be still more increased. This, so far, has been impractical.

Another method of eliminating the secondary rays is to diminish the area of the body that is exposed. This fact was recognized by Albers-Schoenberg when he first used the diaphragm or compression blend of cases for abdominal radiograms.

Subsequently I attempted to use these cones or compression blends for various areas of an abdomen on a single large plate, but this was unsuccessful, and later I used a series of parallel slots, two in front and one behind the patient.

These three parallel slots were made to accomplish, by a totally different method, what has been accomplished by the Potter Bucky diaphragm.

This has been developed to the experimental stage, but has not been applied to practical radiography.

I believe that a combination of the Potter Bucky grid behind the patient moving in one direction and in parallel slots in front of the patient moving at right angles to the grid will still more increase the contrast of the plates.

It is strange how history repeats itself. Fourteen years ago, when I first attended a meeting of the American Roentgen Ray Society, I read an article on Direct, Indirect and Secondary Radiation, and that article at this date has a definitely direct bearing on the work of Potter and the work that we are now all interested in, viz: the elimination of secondary rays.

Dr. Steiner, my associate, told me that I could not talk these Direct, Indirect and Secondary rays to an audience and make them understand my conception of them, because he had lived with me for four years and could not yet understand by conception of them; and after reading the notes submitted by the stenographer I have decided he was right.

I am, however, going to attempt, at the next meeting, to describe and demonstrate my conception of Direct, Indirect and Secondary radiation.

*—Read at mid-year meeting of The Radiological Society of North America, held at Boston, June 3 and 4, 1921.



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The JOURNAL OF RADIOLOGY

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The Twilight and the Dawn

I.

A thoughtful search of the calendar of medical achievement for some powerful way to express the intense feeling which will inspire every man who attends the annual meeting of The Radiological Society of North America brings one very close to the high conception of human service which is the foundation of the science of medicine. It also holds a remarkable fascination, something akin to which public speakers must feel when they are able to tell a story of human conduct in such a vivid way as to make audiences laugh and weep alternately.

The science of medicine is not entirely devoid of funny incidents. That, however, is not the picture sought to be presented here. The time is one for serious thought. No man, no matter at what particular place or time he moved in the history of the world, ever lived in a moment of greater portent. No man ever struggled to mas-

ter a more delicate and intricate question than that which embraces the national health. That is especially true when it is remembered that the answer to this great problem must very soon be written with a strong hand across the blackboard of eternity, and as written, will absolutely determine whether the medical profession is to become a dynamic force in national affairs, in social stability, in industrial progress, in economic righteousness, and in political decency; or whether, due almost entirely to its own inertia, the medical profession is eventually to become a miserable representation of those inviolable principles which have been its bill of rights wherever human suffering was found.

A conscientious effort to interpret the meaning, the cause, and the issues of the life we live, is bound to compel any man who attempts it to use figures of speech common to all men, and which per se hold that vital inner urge expressed in common appeal and universal understanding. There is plenty of justification for that method, though frankly, there would seem to be no need for justification beyond the tremendous importance which the question of national health holds for every man. As the professed guardian of the public health, the medical profession enjoys unprecedented opportunity for human service. And its responsibilities are just as surely commensurate with that opportunity.

II.

The purpose of this discussion is to crystallize a number of thoughts previously advanced, to clarify the supporting causes behind those ideals for which The Journal has striven, and to make an impartial and honest comparison between the opportunity and

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the obligation the medical profession enjoys as the inevitable consequence of its protestations of human service.

Preventive medicine occupies a prominent place in public and professional thought. It is but the logical and essential development of the science of medicine. Social medicine is being consistently advocated by a great many men. It is a sure sign the medical profession faces fundamental reconstitution. Much of what follows will essentially deal with the various aspects of those two phases of the question. And while some of the illustrations used to demonstrate certain points may seem to wander far afield, yet they have deliberate purpose and exact application to some particular angle of the subject if you will exercise the patience to follow through.

III.

Speaking in terms easily comprehensible, it would seem that the present condition of medical practice is fairly comparable to a daily natural phenomena, with its consequent reactions on the members of the human family. Reference is made to the transition from day to night, night to day, and the period of repose intervening. The twilight hour affords a period for reflection when the day's deeds may be recounted deliberately. Night kindly hides the jagged stones on which conquering feet must bleed. Dawn brings a compelling witchery and sorcery. While the combination of the three lays hold of men with a spirit of intrigue which stimulates nearly all men to action, and some men to great achievement.

While the psychology of the thing may not be entirely understood, there is something peculiarly fortifying about that sort of self-communion which some men enjoy at the twilight hour. It provides a cumulative power to accomplish substantial things. Life passes in review in a sort of panoramic

pastel on which kindly thoughts and forms appear in the delicate hues of hope, of ambition, of love.

Contrariwise, there is something impelling about the dawn. It is the beginning of things anew. The scars of defeat are forgotten in the lure, the novelty, and the romance of certain success, and hope warms the blood.

IV.

The annual meeting is the summation of a year of earnest endeavor. It is a period of transition. It is a scientific metamorphosis. Men from all parts of the United States, Canada, Mexico, Cuba, England, France and Germany come to a common meeting place for a common purpose. They are actuated by common ideals. They know that in the free interchange of ideas, experiences, observations, aspirations, knowledge is formed—that knowledge which justifies and revivifies the earnestness, the hopefulness, the zealous pursuit which they give to the problem of adding a cubit to the stature of a diseased and distorted humankind, which they accord their promise of a fair measure of comfort and health for a sick world.

V.

Reviewing the potential possibilities of medical science, is there not need for that calm deliberation and invigorating atmosphere which so characteristically and so exactly merges the failures of today into the successes of the morrow? In the reconstitution of the medical profession which appears so imminent, must not our judgment be tempered, our aspirations renewed, by the fact that the science of health must extend to the widest shores of a human world, and jut out here and there and everywhere into a sea fed by the bitter tears of millions of men and women and children who come to the medical profession asking bread, and to whom that profession must reluctantly give a stone? May we not find in this meeting some significant

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fact that will effectually lay the ghosts of the science of medicine as they stalk about in the shadows of our own shortcomings, give us assurance that the morrow will be a day of greater usefulness, and thus cheat the dark hours of human service of their fearful congery?

VI.

Developing the idea a little further, is there not an abundance of evidence everywhere to support the view that the science of medicine is in the twilight hour of its progress, and that it is but the part of prudence to lay specific plans for the dawn of that new day so near at hand—a dawn which will unquestionably measure the value of medical science as a social factor by the sort of intelligent social service it accords the nation? Or, is there any question that the practice of medicine as it is conducted today, fails to respond constructively to the economic and social needs of a hundred millions of people whose ability to do a day's work is a prime condition of their existence? Can any one successfully refute the wisdom of a preventive, positive, cohesive, and organic national health program into which all the achievements of the medical profession can be incorporated?

Finally, should the medical profession, composed as it is of men of high ideals and large scientific training, be expected to drift along in an idyllic state of nonchalance while the greatest potential science for human betterment is robbed of its manhood, deprived of its spirit, and plundered of its soul?

VII.

These are the reasons why the medical man as an individual is struggling under a heavy load—a load which is utterly beyond his capacity. It is the reason, also, for going back behind the actual science of medicine and applying the rudiments of that scientific training to the laying down of a formula which will find the un-

known factors in the great problem of social well-being. In this way, and in this way only, can there ever be any assurance that every member of the medical profession is building his particular part of the whole social structure in conformity with those ideals and purposes which are bound to grow out of the concerted effort of the entire profession to accomplish an inclusive and conclusive health program.

It certainly cannot be reasonably expected individualistic study and opinion concerning this important question will merge into a harmonious conception either of its possibilities or its probabilities unless, and until, the problems and thoughts of those individuals have been conjointly stimulated and refined, and hammered into sound judgment by the simple expedient of compelling every man to lay what he sees against what every other man sees.

That you are going to counter with some reference to the combined effort of the medical profession in the promulgation of "Cancer Week," there isn't the slightest doubt. But reviewing all the arguments advanced in its behalf both within and without the profession, summing the whole thing up in a composite picture for critical analysis, one is inexorably forced to accept the conclusion that the thing which holds the medical profession in leash, the thing which degenerates into an impasse an otherwise laudable effort to acquaint the public with exact knowledge concerning this horrible disease, is a colossal confusion of ideas which suggests that specialty is arrayed against specialty, is that sheer lack of continuity which provides the public with ample ground for believing that there is neither unanimity of purpose nor sustained effort in the ranks of the medical profession.

Quite naturally, it is not supposed that The American College of Surgeons conceived this campaign for the

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purpose of deifying the knife. However, more than one surgeon, speaking on the public platform under the auspices of the "Cancer Week Program" was heard to make the silly assertion that the knife was and is the only method of relief known to medical science in the treatment of this frightful scourge.

VIII.

This publication endeavors to correctly represent leading radiological opinion predicated on correct medical knowledge. For this reason, it does not hold the childish view that radiology is the only method of treating cancer or any other disease. It firmly believes it is much more sensible to admit the truth, which is, first, that many cases of cancer, as well as other diseases, are incurable so far as medical, surgical, and radiological science and skill now go; second, that in some cases surgery is a very proper method of relief; and third, that in many cases, exactly in the proportion more certain knowledge of the possibilities of the science of radiology increases, that science, in the hands of competent medical men, is capable of very beneficial results pre-operatively, post-operatively and inoperatively.

IX.

It is not the purpose of this thesis, however, to engage in a purely controversial discussion of method. There can be no opposition to the proposition that every case should be handled according to its peculiar history and conditions, and treatment rendered which accomplishes the best results for the patient. That is the premise on which this discussion proceeds. The incident is cited merely to prove that there is a fundamental weakness in the profession as at present constituted, a weakness which renders it incohesive, and gives birth to that spirit of public distrust and uncertainty every medical man experiences every day in his private practice.

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That sort of a condition cannot endure, simply because the public will no longer tolerate it. Nor should the medical profession permit it to endure.

The problem is one of procedure and organization, which, stripped of all dissembling and mouthing, resolves itself into the question whether the medical profession will assume the responsibility for setting its own house in order that it may serve the national health effectually and intelligently, or whether it prefers to let other agencies prescribe its sphere of activity, and restrict its field of responsibility and opportunity simply because it has failed to fully appreciate its inherent obligations; and failing to appreciate them, has introduced into the record of human conduct the utter incapacity of medical science to function as a constructive social agency.

X.

There is nothing flamboyant about this statement of the facts. If ever there was a time in the history of the medical profession when individual practitioners needed to suppress all petty jealousies, submerge personal aggrandizement, and devote every ounce of energy they possess to the conception and discharge of a constructive national health program, that time is now, when the future of the profession is in the balance. There must be unity of purpose, loyalty to ideals, and an intensity of devotion to the achievement of those vital things which beget the blessings of suffering humanity and which constitute sufficient justification for large public confidence in the vision which that profession holds of its own and the public welfare.

These are plain words. But an emergency exists, and there is neither the time nor the inclination to waste effort in useless pettifogging and interminable discussion of insignificant details.

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XI.

The issues involved in the practice of medicine are very different today than they were in the nineteenth or even the early part of the twentieth century. The change has produced a lot of uncritical drifters, men who have become hopelessly confused trying to determine the course of blind social currents coming from everywhere and leading nowhere. Today the future is menacing and unfamiliar. Everybody is grabbing for a friendly lamp post in a giddy world.

Obviously, there is great need for enlightened leadership. The socio-economic welter is struggling for crystallization, direction, deliberate purpose. H. G. Wells succinctly states the situation when he says, "These big questions affect everybody, also they are too big for anybody."

The medical profession is not exempt. The flow of patients does not follow previously established lines. Men and women defer medical attention until the compulsion of fear operates. And there is a widespread physical and mental neurosis which is destroying the individual will to live correctly, the mandates of health and public welfare considered.

Perhaps this sounds like an extravagant statement. But when it is remembered that the statistics compiled by the United States Surgeon General in examinations conducted under the selective service drafts, show more than fifty per cent of the total population suffering from diseases, a great many of which are absolutely preventable, there is ample justification for vigorous language. And perhaps, too, that fact in and of itself, is sufficient reason in the average person's mind for pinning his faith to a nationalistic scheme of medicine; at least that would be the logical conclusion drawn by men vigorously schooled in nationalistic principle and spirit during the war.

Whatever the cause, the fact is that men have temporarily lost their sense of direction. They are wasting their energies in gabbing about the necessity of "getting back to normal." They fail to recognize that a new social level has been established, and that the normal of today is an altogether different condition than it was yesterday; they don't like the process incident to the readjustment of their lives to fit a different state of facts which requires different standards of social and economic activity; they would much prefer to pursue the old habits of geographic culture; they feel an uncomfortable squeeze about their ribs, gasp for air, and try to reduce their physical and mental proportions instead of buying a new suit of clothes and consciously accepting the benefits of the new world in which they live.

XII.

It is not expected that the medical profession will assume the responsibility for all the ills of the human family without a struggle. A good many of the members of that profession are going to insist very earnestly these things are not within the province of medical science.

But preventive medicine must mean this sort of thing in view of the broad contact of the medical profession with every phase of human conduct. It must mean infinitely more than the mere use of the police power of the state to safeguard the life and property of the community, or it is as false a god as was ever conceived. It must mean that there is some obligation on the part of the medical profession to acquire specific knowledge concerning the immigration question its relation to the public health, with the resulting responsibility of applying that knowledge in the erection of preventive agencies. It must mean that there is some relation between the present housing shortage and the public health, and that it is

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absolutely impossible for the medical profession to prescribe either preventively or curatively in an intelligent fashion without definite knowledge concerning what that relation actually is. It must mean that there is some causal connection between the question of unemployment and the physical and mental stamina of those persons without jobs, to say nothing of their dependent wives and babies; and if it be admitted such a relation exists, how in the name of common sense is the medical profession going to prevent or definitely cure the thing all the world accepts as the result unless it makes an earnest, conscientious and honest effort to understand and remove the cause?

XIII.

These are but a few of the intricate ramifications of the numerous phases of modern medical practice. But they are sufficient, it is believed, to demonstrate beyond the point of dispute the justice in the current criticism of the medical profession; and further, that the medical profession will have to pursue some deliberate program which will coördinate all the latent forces of medical science into a national health plan, or publicly admit that it is unwilling and incompetent to undertake the task which is inherent in the science it employs.

XIV.

By this time the average medical man will be ready to say, "Granted, all you say is true, what specific plan or suggestion have you as self-appointed critic to offer which gives any promise of the achievement of this larger purpose so graciously thrust on the medical profession?"

Such a question is both pertinent and timely. But the man who asks it is going to be keenly disappointed, both in the striking simplicity and patent tediousness of the only answer that can be made to such a question; first, that human relations are not static so that a man can state a few

specific facts, memorize a few fundamental principles, and say to the balance of the world, "Achieve these or be damned." Second, that the setting up of such a health program is not the job of one man, but rather the job of all medical men, because each is an important daily factor in the machinery of public health and opinion. And third, that before even the first meagre beginnings of such a program can be definitely stated, it will be necessary to make a complete survey of the nation for the purpose of getting a composite expression of the opinion and requirements of people engaged in all lines of endeavor, and the immediate facilities the medical profession itself can muster.

Perhaps that sounds like begging the question at issue. In a sense, it is. But it is the only possible method of understanding the situation, of avoiding the present accusations of purposeless drift, of preserving to the medical profession the dignity and opportunity for human service which it has always guaranteed to every man who bears the medical insignia as evidence of an unfrightened, masterful, and humble approach to life's realities, and of coördinating and correlating all branches of medicine and the collateral sciences into a cohesive and comprehensive effort to achieve a better universal public health.

One must necessarily commit himself to such a tremendous undertaking with an abiding faith in the vision, the sincerity of purpose, and the high ideals of the medical profession. But its record of accomplishments justifies the hope that the medical profession will find the will to tackle the job, and the constancy of purpose to grapple with it until something really tangible and worth while has been evolved.

XV.

Coming now to the more specific part of this discussion as it involves the science of radiology. Radiologists

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are trying to speed the dawn, a dawn, if you please, of diminished human suffering and enlarged scientific service, through the application of light waves advanced to the point of invisibility. To be sure, that is an immense ambition. It is exceedingly scientific. But it must be extremely human at all times, for on every hand appear men and women demanding succor, relief, prevention, cure, beyond the ability of the medical radiologist to give or promise.

Small wonder, then, that in this effort to reach some common conclusion concerning the future of all medical science, The Radiological Society of North America should be in the forefront. Surely the members of that society may not be criticized for seeking the inspiration and concomitant wisdom of full communion among all medical men on the perplexing questions which inevitably confront them. Surely they cannot be blamed for taking deliberate counsel with respect to that basis on which the medical profession can be organized in order to render an intelligent and constructive national health service. Surely, their motives cannot be impugned if perchance they want to know whether the medical profession of the future is to be more highly specialized, and then grouped for preventive and curative practice according to geographical units, political subdivisions, or social and industrial classifications. Surely, they may not be said to be altogether presumptuous for asking how any comprehensive organization of the medical profession is to be governed, whether by representation or direct vote; and for wanting to know what measures will be instituted to avoid the damning effects of inter-organizational politics and petty jealousies in the one case, and the stifling inertia and obsolescence of disinterested and irresponsible administration in the other. Surely they may not be

accused of unprofessional conduct for suggesting that these are pertinent and grave questions which are absolutely certain to appear in any constructive organization of medicine, and that upon the capacity of the medical profession to develop and constitute a progressive and efficient government in its own affairs, depends the measure of confidence and responsibility the public will impose upon it, and permit it to assume in the matter of the national health.

XVI.

Remembering that it is a mighty poor rule which doesn't work both ways, and striving to be constantly thoughtful of the profound responsibilities which rest so harshly on the radiological profession, The Radiological Society of North America perceives it to be its imperative duty to lend every assistance of which it is capable to the formulation of an intelligent national health service. To this end it earnestly solicits the coöperation of medical men particularly, and will welcome conjunctive action on the part of all other agencies sincerely seeking a part in the unselfish elevation of the physical, mental and moral fibre of the human family.

XVII.

Such a serious study must have a place of beginning. With full confidence in its efficacy, the suggestion is made that the first step is the creation of a research bureau whose activities shall cover both the social and scientific phases of this important question.

On the social side, there is such a paucity of information concerning the large questions hinted at, as well as scores of others, and on the scientific side, there is such complete lack of coördination and purpose in the prevention and cure of disease, that no thinking man will offer any resistance to the creation of such an agency, and certainly no medical man will be heard to oppose it for the very good and suf-

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ficient reason that it will unquestionably open the door to greater human service and a renewed assurance of the future existence of the medical profession.

Think of the magnificent opportunities which await the magic touch of the combined intellect of the whole medical profession, the learned physicists, and expert engineers working in collaboration, synchronization, and preconceived unison toward the one great object of national health! Is there need for detailed statement concerning the value and the potential possibilities, pathologically and physiologically, of coördinating and correlating all these wonderful sciences on such specific problems as the prevention and cure of cancer, tuberculosis, leprosy, and dozens of others which now mock the individual effort of every medical man?

Simply to illustrate this point radiologically, what would it mean to the medical radiologist to have such a bureau study and determine the action of radiation on the tissues, biologically, bio-chemically, and bio-physically? Would not that information definitely establish which side of the spectrum should be used in the treatment of malignant diseases, and whether, and to what extent, there is ground for hope in the further development of high potential apparatus? Would not that information enable the radiological profession to so standardize its technique as to render its applicability more nearly universally productive of those results which some of the members of that profession are able to obtain in random cases?

The activities suggested are neither inclusive nor conclusive. They are intended only to be stimulative. It is impossible in this sort of a discussion to set up anything like a complete plan. There are so many other ways in which such a bureau can function as the basic element in medical science

that the only limitations it will encounter will be the natural limitations of capacity of vision and enterprise on the part of those who conceive and constitute it.

XVIII.

This kind of a program will have to start in a small way. But a great deal of invaluable work can be done by a comparatively small staff for an inconsequential expenditure, the numerical personnel of those directly interested in it considered. The funds for development will be forthcoming once the movement is under way, and its enormous practicability demonstrated.

As has been previously stated in The Journal, a research bureau is of such vital concern that it should not be brushed aside as an opportunist's dream. It is a carefully thought out plan for accomplishing realities, and needs but the hearty support of the medical profession to make it a remarkably prodigious achievement in medical and social science.

XIX.

The Twilight and The Dawn! Is it going too far to express the hope that the annual meeting of The Radiological Society of North America this year, will definitely mark the consummation of the transition which begins in mature deliberation grounded in a life of human service and sacrifice, and carries over into the dawn of an era of large constructive social service like which there is no precedent in medical science? Is it too much to bespeak for every man who attends the meeting an inspiration flowing from certain knowledge that the medical profession has struck out boldly, courageously, and understandingly toward the attainment of those fundamental things which inevitably mean greater health and happiness for the men and women and children of this nation?

An Inexpensive Record System

THIS article owes its inception to an article recently published by Dr. R. D. Carman of The Mayo Clinic in the July issue of the American Journal of Roentgenology, in which the system in use in The Mayo Clinic for keeping the record of all cases radiographed therein and for filing the films of such cases is explained in detail. All credit must be given to this system as it covers the ground thoroughly, is complete and at the same time is compact. The great objection that can be made to it is that it requires the work of several clerks and at least one stenographer to complete it and keep it up to date; that it requires expensive filing cabinets and much stationery and that in using plates, it requires filing room far larger than can be given it elsewhere than in clinics such as this one. While this system is applicable to a hospital of the standard of The Mayo Clinic and a hospital which can afford to furnish the amount of space required, pay the salaries of the clerical force necessary to keep it always in order and up to date, and afford the stationary and filing facilities it demands; most of us are of necessity barred from membership in such an institution and the hospitals with which we are connected and in which we do our "bits" cannot afford to allow us the expenses and the space necessary in our work, much less pay for stationary and clerical help in addition.

I have therefore prepared a short outline of the system I am using and which is serving to keep for me, by my own efforts, a record of my radiographic work and a filing record of

all films; feeling that it may serve as a basis upon which improvements may be suggested until through the contributions of many men from the smaller towns, the ideal and perfect system may be evolved, that may be in use by all men and that will be sufficiently inexpensive to suit all of us, sufficiently concise that it will not be a drain upon limited time, and yet of paramount importance, that will be sufficiently clear to enable us to keep a perfect, graphic record of all cases. There is nothing startling, original or scientific in this system, but it is workable and it can be kept up to date by a few moments work each day.

When the patient comes up to the x-ray room, the record card is filled out by the roentgenologist before making the examination. This card in the system I am using, was made for me by the McCaskey Register Co., of Alliance, O., to fit their system of case-records, and is filed at the end of the examination and after the diagnosis is made in the filing system they provide. The form and composition used thereon is my own, however, and should one not have such a system, can be readily made to fit any size card for filing, by any printing firm. It will be noted that the first page contains the information necessary for making the radiograph. First is the name of the patient, or of the corporation, if the patient is an employe of any corporation, next the address of the patient, and the occupation. The date and the price for examination are also placed in a prominent position. Next follows a description of the patient including sex, age, height, weight, race, marital status, whether

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the examination was for himself or some member of his family and if so the name and status in the family of the patient. Whether the examination was made at office, at home or at hospital. Below this are the date of injury, the symptoms, the method of injury, the clinical diagnosis and the first page closes with the radiographic case number.

The second page is devoted to covering two subjects. The upper half is devoted to technique and contains the essential details on this subject. The lower half contains the space for plate analysis, followed by radiographic diagnosis. This is followed by a space showing the time when report on the case was rendered and the method in which same was rendered. The third and fourth pages are devoted to a resume of fluoroscopic examination of lungs, heart and gastro-intestinal work and do not relate to this subject.

After page one is filled out, a record of the case is made in a standard columnar book. The one I am using is No. 21, and contains room on one line, writing across both sides of the page, for the following information: (1) the date, (2) the patient's name, (3) the patient's address, (4) the case number, (5) the name of the referring physician, (6) the part to be radiographed, (7) the charge for examination, (8) the date of payment. By filling out this record we obtain the case number which is placed on the last line of the record card and is used on all films made of the case, regardless of anatomical locality.

To mark the films, the Victor stencil plate marker set is used. The top line contains the name of the institution, the bottom line contains the case number. The bottom line is subdivided in such a manner that the case number is contained on the left hand side of the marker, while on the right hand side are inserted the numerals corresponding to the month, day and

year. By this means the case number comes first on the film; and following it we have recorded the date in addition. To illustrate:

St. Luke's Hospital

2063—9121

would mean that the case number was 2063, and that the films for the examination were made on September 1st, 1921. Films are further marked "right" and "left" and if desired the position in which same were made is added, by the use of small lead letters, stuck into adhesive strips, and additional adhesive used to cover the letters and stick them in proper position upon the cassette.

After the films are developed and dried they are then examined and studied for recognition of pathology. If none is found that is so recorded on the record sheet and the physician referring the case is so notified. If any pathology is discovered, a letter describing same is written to the physician referring the case explaining the pathology found and the x-ray diagnosis made. A carbon copy of this letter is fastened by a Hotchkiss staple to the case record as described above. The films are now ready to be filed away.

After many trials, I personally have found nothing for filing purposes to equal the cartons furnished by the Eastman Kodak Co., in which the duplitized films are shipped. Each carton will hold comfortably and easily from sixty to seventy-five films. Before placing the films in the appropriate carton, a small sticker is placed in one corner of the film, so that it shall be on the top left hand corner of film. These stickers are made by cutting into one-inch strips, a piece of the brown paper now in use by many merchants to replace string or cord in fastening packages, and which comes in rolls of eight hundred feet, a roll costing the roentgenologist, from any of his friends who buy same in large quantities, not to exceed 50

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cents. This paper contains glue on one side and once the glue side is wet and stuck, it stays stuck. It is used by The Eastman Co., to fasten the top to the carton in order to keep the films perfect and free from light contamination. An ink pad and a small rotating numbering stamp, such as is used by many of the parcel post offices to stamp the number upon the packages sent insured, and which costs from 50 to 75 cents, is now used and the film marked with the number and if desired the date contained in the film. The film is then slipped in the appropriate sized carton then in use for filing purposes in such a manner that the number on the sticker is on the top left hand side of film and on the top left hand side of carton, so that in the event the films are desired, the numbers on same in this carton can readily be ascertained.

Across the top of these cartons is stuck a strip of the same glued paper mentioned above, to cover the writing used by The Eastman Film Co., as well as to permit writing thereon the essentials for properly filing same. Starting in at the left hand end of the top are written (1) the year, (2) the volume number for that year, (3) the size of films therein contained, (4) the numbers of the first and last films in the carton, (5) the title for the class of films kept therein, and (6) in the right hand corner the key number for cross-filing and cross-indexing purposes. To illustrate:

1921 Vol. III, 8x10's. Bone Films. No. 1084 to 1162 A 36.

This key number is easily remembered and distinguished. Inasmuch as no separate cartons are kept for 5x7 or 10x12 films, they are placed in the carton in which they fit properly. Thus the 5x7 films go into the 8x10 cartons, and the 10x12 films, into the 11x14 carton. The key letter for 8x10 cartons is "A", after which letter is placed a number, which is in reality the number of that especial

carton, and saves writing the year and volume number on the cross index card. I use numbers 1 to 300 to represent bone pathology films, 300 to 600 for gastro-intestinal films, 600 to 900 for genito-urinary films and 900 to 1000 for apex films in lung work. The next size, 11x14 films, contain the letter "B" as their key letter, with the same numerals to distinguish the classification of the films therein contained. The third size, 14x17 films use the letter "C" as their key letter. Here the numerals differ slightly, inasmuch as the greater portion of this size films are used for chest work. And 1 to 300 represent chest films for lung cases, 300 to 600 gastro-intestinal films, 600 to 900 genito-urinary films and 900 to 1000 cardiac films.

For cross-filing, either a card index system can easily be used with the above described system or I prefer a loose-leaf ledger, using cardboard sheets cut to allow marginal tabs for filing the main subjects, and subdivisions thereunder for the different forms of pathology.

These cartons are kept in a cabinet, which complete cost \$10.00 and which as it stands is an ornament to any office. This cabinet was built separate and can be moved to any part of the room or to any desired room, and contains facilities for filing films some a number of years for the roentgenologist who does not have an extensive practice. When it is filled another can be built and added to it, and thus the filing continued. The cabinet is seventy-two inches high, by thirty-six inches wide by twenty inches deep. It is solid throughout, and can be constructed by any carpenter who is a neat and careful workman. The front is composed of two doors which meet in the center, fasten with catch, and swing wide open. Each door is panelled with beaver board. The interior of the cabinet is divided cross-wise into four

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compartments. The first is ten and one-half inches in height, and provides room for the 8x10 films. The second is twelve and one-half inches in height, and is used for the 11x14 films. The third and the bottom compartments are fifteen inches each, and are for storing the 14x17 films. Excepting the top compartment which is left undivided, each of the remaining compartments are subdivided by partitions into four compartments, nine inches in width, for filing the different subdivisions into which this size of film is divided. I would roughly estimate that this cabinet contains filing facilities for one hundred and thirty cartons of films, which is ample for some time for the average roentgenologist in a smaller town or city.

An additional feature that may be added at but an extremely slight cost consists of wooden racks for holding film hangers used in tank development and for holding the washed films until they are dry. Since using the ones I am about to describe, I notice that one large x-ray manufacturing firm has placed a metal rack similar to this on the market. However, the ones in use here originated independent of their ideas and are certainly considerably cheaper to say the least. These can be made by any carpenter, and mine cost me exactly \$1.50 each. Each frame consists of two right-angle triangles. The frame of each triangle is made of 13x16x13/4-inch dressed wood. The back is 24 inches in length, the top, 18, and the hypotenuse of the triangle which forms the front of the rack, and is the side used for holding the films, is 30 inches in length. These triangles are joined together by three cross pieces of the same size material previously described, one cross-piece being at the top of the back and one at the bottom of the back, and the third at the top in front. They are inset into the triangles to strengthen

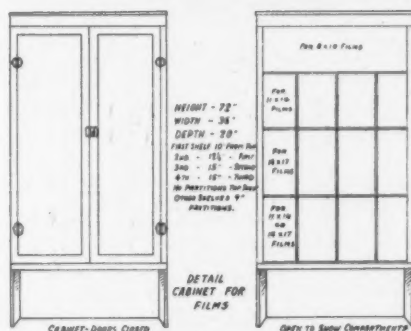
them and are of such width that the frame hangers will just clear the two triangles by one-eighth inch on either side. This measures exactly 16 inches. Two pieces of dressed material, one-half inch thick, by one and three-quarters inch wide are now cut and their ends suitably prepared so that they will fit accurately into the inner surface of the hypotenuse of the triangles above described. In the frame to hold the unused hangers, these pieces are bored entirely through (making the holes correspond on both pieces) with augur and a bit making a hole one inch in diameter, in six places, the holes being five inches apart from center to center. The pieces are then set on the inner surface of the thirty-inch side of the triangle and nailed into place. With a small hand saw, insets measuring one-quarter inch in width are then sawed into each hole from the front of the frame, at the upper margin of the hole. This in order that the hangers will not jump out. The hangers are slipped into the frame or rack through the inset into the hole, and each hole will accommodate five to six hangers. When finished the frame can be nailed or screwed by the two cross-pieces joining the frame in the back, which gives it ample support. In the rack used for drying the films the same triangles are used. The difference in this frame consists in the size and number of holes bored through the half inch strips. Here the holes are made two inches apart, center to center, and are bored out with one-half inch holes. This gives room for twelve films to dry, and if care is used when they are placed upon the rack, no film will impinge upon the one in front of or behind it, thus causing the films to stick together while drying. The rack for drying the films is nailed, as was the other over the sink, so that the drainage from the films will not soil nor dampen the floor. I have found it

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considerably more convenient to use two racks for drying films, instead of one larger rack, thus having room to dry a maximum of twenty-four films at one time, which is usually ample to cover ordinary work. A coat of lamp black applied to the racks makes them look better and increases the wearing qualities.

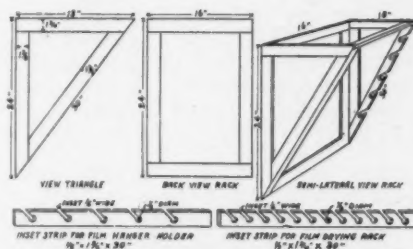
The above described outfit, including everything, save the McCaskey Filing Cabinet, but making allowance for converting a drawer or two in the regular office desk for filing records, and including record cards, film marking outfit, stamping outfit for films, three film-holding racks, cabinet for filing, and system for cross-index-

This system gives a complete record as to name and clinical history, enables the roentgenologist to check up and develop a standard and uniform technique, gives him a record of plate analysis and of time and manner of reporting results, which can be used in the event he is called to testify in court and gives him a record of the finding in every case, and preserves in a logical manner and in logical sequence his films on all cases. It furnishes him with a means of cross-indexing his cases and enabling him to present statistics on any given subject within his scope. It is applicable to any and all roentgenologists regardless of the size of their practice and best of all, it can be kept



ing records and films, either by cards or loose-leaf ledger, can be installed by any one for less than \$40.00 as follows:

500 Record Cards.....	\$ 7.50
Cabinet	10.00
Film Marking Set, with extra letters and figures.....	4.00
Paint and brush for painting cabinet and racks.....	2.00
Changing desk drawers to filing cabinet and alphabetical index for same	2.50
Hotchkiss Automatic Paper Fastener and Staples.....	3.00
Racks for holding hangers and drying films.....	4.50
Cross-index cards and file, or loose-leaf ledger.....	2.50
Stickers and stamping outfit for films	1.50
Standard Columnar book, for record keeping.....	1.75
TOTAL	\$39.25



in order and up to date by a few minutes work each day by the roentgenologist or his office girl and does not require the use of a clerical staff.

IRWIN P. LEVI, M. D.,
Anniston, Ala.

Perineal Treatment Stand

THE requirements for a simple, inexpensive apparatus for treating the perineum by means of the x-ray seems to be quite satisfactorily covered in the accompanying illustrations.

It is constructed of light but substantial wood and is lead covered under the top and behind the front. The aperture in the top is a circle six inches in diameter and may be covered with aluminum or other filters placed beneath in wooden slots provided for their use.

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Fibre rods support the tube carrier and also project from the sides to hold the high tension wires at a safe distance from the patient. Three anode skin distances have been provided, viz., 8-10-12 inches, and the tube may be raised or lowered by inserting the fibre rods through holes behind and screw eyes in front, either up or down as desired.

The apparatus is being used with much satisfaction. No material improvements have been suggested by experience. It might be advisable to make it collapsable where space is a factor.

The lead lining is, of course, grounded while treating and the patient's feet should rest upon wooden blocks or a small wooden stool.

The measurements are as follows:

Top, 18 inches wide and 19 inches deep. Front and side pieces, height, 24 inches; breadth at bottom, 24 inches. Front to back at bottom, 26 inches. Diameter circle in top, 6 inches.

DRS. GROOVER, CHRISTIE AND MERRITT, Washington, D. C.

LEGENDS

Fig. I.—Top view of perineal treatment stand, showing the six-inch opening and the fibre rods for keeping the high tension wires at a safe distance from the patient.

Fig. II.—Back view of perineal treatment stand, also showing the fibre rods.

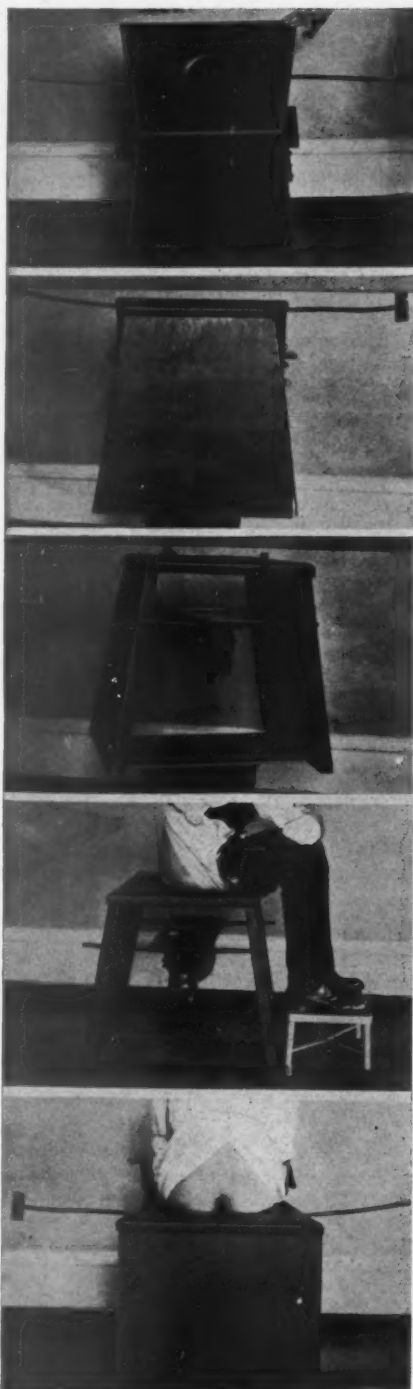
Fig. III.—Side view, showing tube in place, supported by fibre rods on hooks.

Fig. IV.—Side view of perineal treatment stand with patient in position.

Fig. V.—Rear view of perineal treatment stand with patient in position.

Film Intensification

WHILE conducting some experiments to determine the influence on the film of secondary radiation derived from material on which the film rests, tables, boards, boxes, etc., I was struck by the decided "intensifying" action produced by ordinary lead foil when this was placed in contact with the back of the film. If this lead foil was doubled the action was more



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intense. Besides said "intensification" the lead foil prevents secondary rays from material back of the film, from affecting the emulsion from the rear. We can take advantage of this action to improve the quality of our finished radiographs.

If, in using a duplitized film, we lay it on a sheet of cardboard covered with a clean and bright lead foil and

then "load" it in the black and orange envelope and take a radiograph as usual, we will find that the resulting image will possess a brilliancy and a richness of detail that many radiologists have denied to be possible to obtain with duplitized films.

JOSEPH S. GIANFRANCESCHI,
Buffalo, N. Y.

Annual Meeting Section

FOR ready reference, it is thought advisable to consolidate all announcements, information concerning railroad rates, and roster and plat of Commercial Exhibit into a special section.

The Commercial Exhibit will be found on the mezzanine floor, and visitors should feel perfectly free to nose about the exhibits and ask questions. Radiologists understand that to be a privilege which is really an opportunity. Competent technicians will be in charge ready to answer all questions.

Attention is also called by this means to the many interesting developments in apparatus evidenced by the displays of the manufacturers. Taken as a whole, as well as individually, the Commercial Exhibit is quite complete and will be found very interesting. Its purpose is to afford everybody full opportunity to study new machines and appliances firsthand and to acquire specific information of technique and correct operation from the mechanical side.

The Radiographic Exhibit of society members, in charge of Dr. Trostler, will also be found on the mezzanine floor. Every one is urged to visit it.

Exhibitors have taken an unusual interest in the annual meeting of The Radiological Society. A spirit of coöperation and courtesy will be manifest on every hand.

Official Business Meeting

AN official business meeting of all officers and counselors of The Radiological Society of North America will be held at 7 P. M. December 6th, 1921, at Hotel Sherman.

Reports of all officers and counselors will be taken up at that time. All officers and counselors must be present if at all possible. If compelled to be absent, written report of the year's work must be sent to the president at once so that it can be presented at this official meeting.

This is extremely important. Your coöperation will be appreciated.

Special Railroad Rates

Effective on all lines operating in territory covered by the Canadian, New England, Southern, Central, Southeastern, Southwestern, Western, and Trunk Line Passenger Associations, special rate of one and one-half fares will be granted all persons attending the annual meeting of The Radiological Society of North America, Chicago, Illinois, December 7th, 8th, 9th, and 10th, 1921.

The rate in question will be under the certificate plan, and conditioned only on a minimum of three hundred fifty tickets validated at Chicago.

To get the advantage of this rate, when you purchase your ticket, demand a certificate from the selling

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agent. Bring that certificate to Chicago and turn it in at time of registration at the Registration Desk. Validation will occur on December 9th and 10th. After securing your validated certificate, present it to the railroad agent, who will sell you a return ticket over the going route at one-half fare.

Dates of sale going, December 3rd

to 9th, with final return limit December 14th.

These rates apply to all persons registering at the annual meeting and to the dependent members of their families of full fare age.

Be sure and get your certificate when buying going ticket and don't forget to turn it in at registration desk when registering.

Roster of Exhibitors

- SPACE**
- INTERNATIONAL X-RAY CORPORATION**..... New York City.—1 and 2
Featuring a deep therapy apparatus capable of delivering an equivalent of twenty-inch spark gap between points. Other new products will also be shown, all designed according to new principles for the purpose of accomplishing greater efficiency. The sphere gap and segmental toroid method of rectification will be displayed.
- CAMERON'S SURGICAL SPECIALTY COMPANY**..... Chicago, Ills.—3
Showing Right Angle Dentalamp for finding abscessed teeth and pathological conditions in the alveolar process; Diagnostolite for transillumination of the sinuses, and other electrically lighted instruments.
- RADIUM CHEMICAL COMPANY**..... Pittsburgh, Pa.—4
Displaying new applicators, screens and other appliances for the therapeutic use of radium. Especial provision for consultation concerning the latest theory and practice in radium therapy.
- EASTMAN KODAK COMPANY**..... Rochester, N. Y.—5 and 6
A display of negatives on Eastman Dupli-Tized films and accessories developed for the purpose of standardizing the photographic phases of roentgenology. Several recent products will be shown for the first time, including a monel metal tank, unit illuminators and a new dental film. There will also be a display of clinical photography, including a camera unit developed for this work.
- SANBORN COMPANY**..... Boston, Mass.—7
Demonstration of closed circuit Metabolism Apparatus, Sanborn Benedict Metabolism Apparatus, and the Sanborn Handy Metabolism Apparatus, under supervision of technicians. Of particular interest to persons treating exophthalmic goiter and hyperthyroid conditions.
- PATTERSON SCREEN COMPANY**..... Towanda, Pa.—8
Emphasizing the New Patterson Cleanable Intensifying Screen. This screen is impervious to dust and dirt. Smearing materials like crayon and soot can readily be washed off. It is also water proof. Liquids can be wiped off without damage to the screen. Patterson Fluoroscopic Screens and the Patterson Operating Fluoroscope will be shown. Messrs. Patterson and Reuter will be in charge of this exhibit.
- MIDDLEWEST LABORATORIES COMPANY**..... Chicago, Ills.—9
Featuring the Metabolimeter and the few simple accessories necessary to Basal Metabolism Determinations. Demonstrations on normal and pathological subjects. Emphasis of the practical clinical application of the method in radio-therapy of goitre.
- LIEBEL-FLARSHEIM COMPANY**..... Cincinnati, O.—10 and 11
Including the complete line of Liebel-Flarsheim x-ray apparatus and accessories.
- GEORGE W. BRADY AND COMPANY**..... Chicago, Ills.—12 and 13
Showing x-ray accessories, treatment timers, intensifying screens, etc.

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- CAMPBELL ELECTRIC COMPANY**.....Lynn, Mass.—14 and 15
This exhibit will consist of the "Clinix" X-ray Plant and Campbell Hospital Portable Unit, the latter of which is designed for use in the wards and corridors of hospitals. Both of these units contain some mighty interesting features.
- THE RADIUM COMPANY OF COLORADO, INC.**.....Denver, Colo.—16
Will exhibit a complete equipment of radium applicators, screens and accessories, of the most approved designs. Representatives in attendance will be glad to give complete information in regard to the technique of radium application and the installation of radium units.
- SWEETBRIAR LABORATORIES**.....Pittsburgh, Pa.—12 and 13
This exhibit will consist of Sweetbriar Intensifying Screens, showing their hard, non-porous, washable surface and extreme flexibility, and demonstrating the use of the Combination Screen in Folder Form. Radiographs will also be exhibited to show the brilliant contrast, remarkable detail, and absolute freedom from grain resulting from the use of Sweetbriar Screens. George W. Brady and Co., of Chicago, western distributors, will be in charge.
- ACME X-RAY COMPANY**.....Chicago, Ills.—18, 19, 20
Presenting a complete x-ray unit, consisting of a radiographic and fluoroscopic table combined with an x-ray transformer, which makes a complete x-ray unit in itself. The two predominating features of this unit are, first, the design which makes it a universal outfit, and second, compactness and lightness in weight. The table is about half the average weight. Many other x-ray accessories and sundries will be shown.
- REBMAN COMPANY**.....New York City—21
Showing medical and surgical hygienic books and journals, especially those which are of interest to Radiologists.
- BUCK X-OGRAPH COMPANY**.....St. Louis, Mo.—22
Displaying X-Ograph Dental Film Packets and X-Ograph Developing and Fixing Chemicals, a new Cassette and Intensifying Screens especially designed for the use of duplitized films, and a complete line of Dental Film Mounts having a violet celluloid window for viewing dental radiographs.
- JAMES PICKER**.....New York City—23 and 24
Exhibiting a line of apparatus, appliances and accessories.
- HORLICK'S MALTED MILK CO.**.....Racine, Wis.—25 and 26
Demonstration of the x-ray uses for "Horlick's" Malted Milk, including illuminated plates showing the product as a suspension media for Barium Sulphate in Roentgenologic diagnosis of gastro-intestinal tract.
- VICTOR X-RAY CORPORATION**.....Chicago, Ills.—27, 28, 29, 30
Chief among the items of interest will be the New Victor Deep Therapy Equipment, new Victor Stabilized Radiographic and Fluoroscopic X-Ray Unit, New Victor Potter Bucky Diaphragm Table with diaphragm, Victor-Kearsley Stabilizer, and the Sphere Gap for measuring x-ray voltages. There will also be shown a new combination Fluoroscope for use in either vertical or horizontal positions, and a combination radiographic table for use in horizontal or vertical position. A line of x-ray supplies and other apparatus will complete this exhibit.
- STANDARD X-RAY COMPANY**.....Chicago, Ills.—31
The question of safety in all x-ray work will be the keynote of this Exhibit, which will include the Standard X-Ray Transformer, Type C, the "Super-Standard," incorporating the patented safety device. Many other new and up-to-date features in laboratory apparatus will also be shown. Tables with added refinements, the efficient Junior Machine, which is marvellous for its compactness and remote control, and a Mobile X-Ray Plant for hospital use. Mr. Hettich will be in charge and assisted by a corps of trained men.
- WILLIAM MEYER COMPANY**.....Chicago, Ills.—32
Featuring the new Meyer transformer, on which milliammeter and kilovolt meter, the latter graduated as a back-up meter, are mounted on the low tension switchboard alongside the primary controls.

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JOHN V. DOEHREN COMPANY.....Chicago, Ills.—33

This company will show a complete line of x-ray supplies of high quality, of both domestic and foreign manufacture, especially the well-known Gehler Folie Intensifying Screen, for which it is agent and general distributor for the entire North American Continent. It will also furnish information concerning the Dessauer Machine for Deep Therapy, which has a capacity of 200,000 volts.

BURDICK CABINET COMPANY.....Milton, Wis.—34

This exhibit will consist of a complete display of air-cooled and water-cooled mercury vapor quartz lamps, designed to produce Ultra-Violet Rays, which can be used effectively for protection against x-ray burns and for their cure. These instruments are used for immunizing normal tissue against x-ray burns in the treatment of malignancy, infection, osteomyelitis, and for superficial skin lesions. After immunizing with the Ultra-Violet Rays, the technician may administer the maximum x-ray dosage for deep seated infections.

FRENCH SCREEN COMPANY.....Detroit, Mich.—35

United States Agents for the French X-Ray Intensifying Screen, manufactured by Messrs. Caplain St. Andre Fils and Cie, Paris. A number of special advantages are claimed for this screen, that is, speed, freedom from grain, breadth of range, thinness and flexibility, and durability. Complete information will be gladly given by those in charge of the exhibit.

RITTER DENTAL MANUFACTURING CO., INC.... Rochester, N. Y.—36

An exhibit consisting of the Ritter Three-Inch Dental X-Ray Unit and the Standard Ritter Dental Chair.

UNITED STATES RADIUM CORPORATION.....New York City—37

Showing latest modes in applicators, radium therapy, etc.

ENGELN ELECTRIC COMPANY.....Cleveland, O.—A and B

Showing the new Keleket Tilting Fluoroscope, together with their new x-ray apparatus for radiographic work. Questions about this apparatus or general x-ray work solicited.

WAITE AND BARTLETT MANUFACTURING CO.... Long Island City—C

Featuring an Oil Immersed X-Ray Unit, New Sphere Gap for accurate reading of high voltage, New Synchronous Motor Treatment Time Switch, New Vibrating Potter-Bucky Diaphragm, Twenty-Inch Interrupterless Machine.

ROENTGEN APPLIANCE COMPANY.....San Francisco—D

This company will show a full line of x-ray apparatus and appliances.

WAPPLER ELECTRIC COMPANY, INC.....Long Island City—E and F

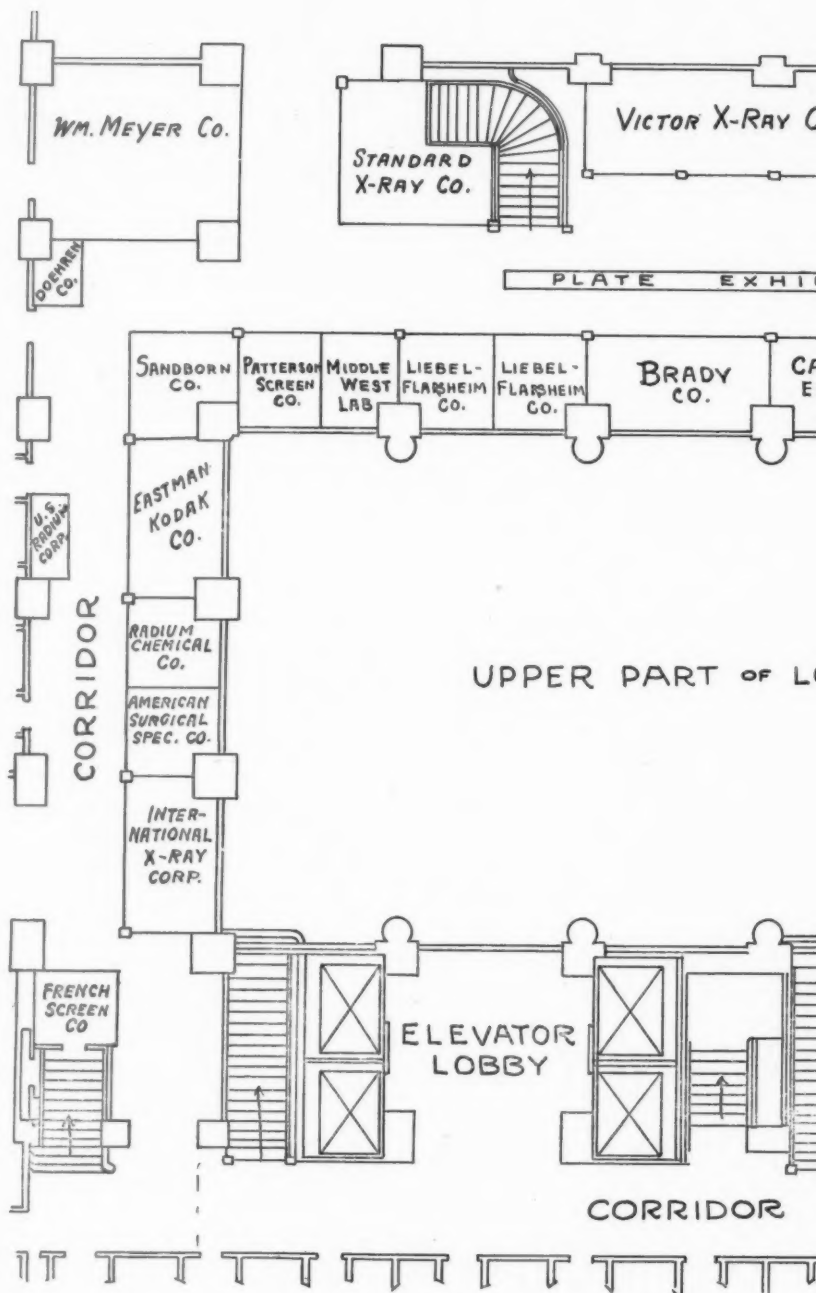
A complete showing of all the new Wappler developments, including Wappler Deep Therapy X-Ray outfit and x-ray producing plant, new Deep Therapy Table, new Treatment Tube Stand, Wappler Sphere Gap, Wappler Unit Coronaless Aerial System, Wappler Portable X-Ray Unit, Wappler Vertical Plate Changer, Wappler No. 4 Table, Wappler No. 5 Bedside and Hospital Unit combining both Dental right angle tube three-inch ten millamperes and regular five-inch thirty milliamperes tube, and the new Wappler Junior Vertical Fluoroscope, latter of which uses a thirty milliampere Coolidge self-rectifying tube.

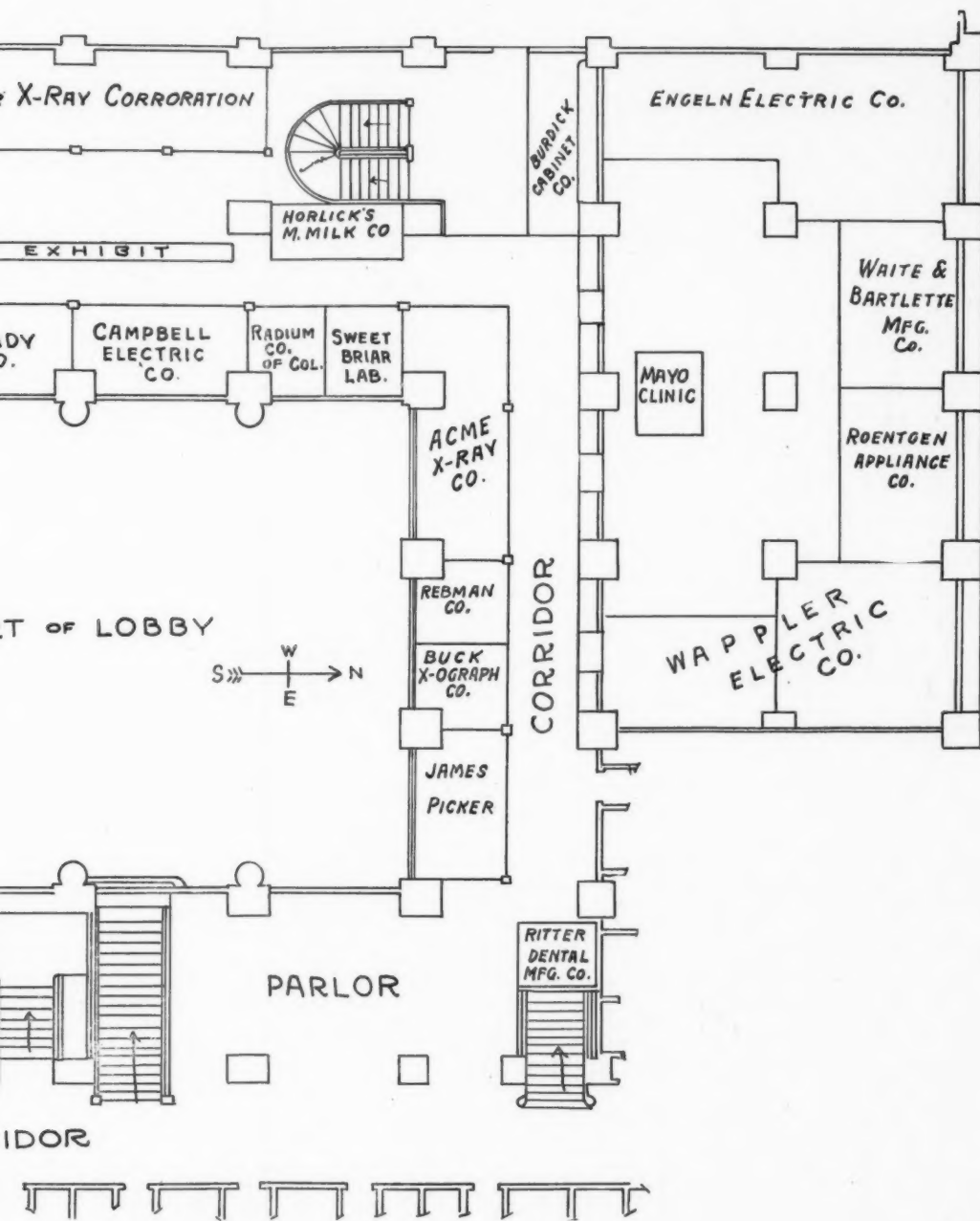
THE HIGH TENSION TRANSFORMER AND EQUIPMENT CO....

.....Hoboken, N. J.—17

Demonstrating a twenty-inch machine, a ten-inch machine, cautery, and high frequency apparatus taking a uni-directional current direct from secondary terminals of high tension transformer. This is something distinctly new in x-ray construction, making possible high potential machines much smaller in size and lighter in weight.

EXPLANATORY NOTE—Consolidation of Sweetbriar Laboratories Exhibit with Brady Company Exhibit, and substitution of High Tension Transformer and Equipment Company in space 17 occurred too late to show in plat of space. Members and visitors will please note substitution.





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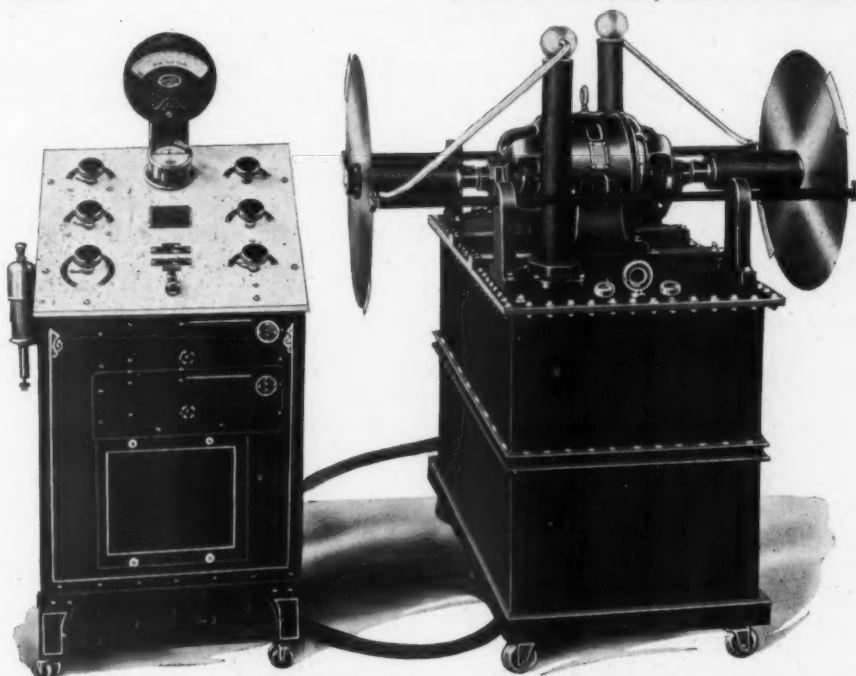
NEW EQUIPMENT

Kelley-Koett Deep Therapy Apparatus

DEVELOPMENTS are coming so rapidly the radiologist is pretty sorely pressed to judge, with any sense of security, which of the recent machines for deep therapy that have come on the market in the last few months, affords the greatest practical possibilities in high potential treatment.

48x52x60 inches over all, so that floor space of 6x8 feet will allow ample room for convenient operation and accessibility.

2. REMOTE CONTROL. This part of the x-ray unit carries kilo-volt meter, polarity indicator, rheostat and auto-transformer switches, motor and main switches, and two filament



In this connection, the new Kelly-Koett apparatus, of which to the time of writing, only meagre information is obtainable, has some distinctive features which commend it to the more scrutinizing members of the profession. These features may be stated in brief fashion:

1. COMPACTNESS. The transformer, or rectifying unit, measures

controls and transformers.

3. CAPACITY. The transformer is said to be capable of producing and operating at 280,000 peak volts, as measured by the sphere gap, or an equivalent of a twenty-inch spark gap.

4. METHOD OF CONSTRUCTION. A synchronous motor is mounted on top of the transformer

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and enclosed in the cabinet of the rectifying unit. As will be noticed in the illustration, the axis of the motor extends outward far enough to provide proper counter-balance for the motor and sufficient space for rectifying disc at each end. This is a novel method of construction, for that it makes possible a more compact unit, and the rectification of an unusual voltage, providing sufficient capacity to operate two tubes simultaneously at the same voltage though at different milliamperage.

5. MILLIAMPERE METERS. Two milliamperage meters are set into the circuit leading to each tube, providing a double check, and making four milliamperage meters to the unit.

6. METHOD OF RECTIFICATION. No definite information has thus far been received concerning the method of rectification employed. A more or less perfunctory study of the outstanding features of the machine as shown in the illustration, however, leads one to the conclusion that this machine rectifies both phases of the electrical wave. This would seem to be borne out by the use of two discs, one at either end of the axis of the synchronous motor, to one of which, judging from the appearance of the take-off circuits, one phase of the current is conducted, and to the other of which the other phase is conveyed. As nearly as can be determined by this purely theoretical calculation, the one phase or peak of the wave passes to the disc through the insulated tube leading from the sphere on top of the terminal post, is diffused over the surface of the disc, picked up and discharged at the point of contact by the connections or plates on the disc through the horizontal cross conductors, and then to the point of take-off for the x-ray tube. The other phase or peak of the wave follows a like circuit, but from the opposite side of the transformer. If this theory is

sound, then this transformer converts both phases of the alternating current into a uni-directional current, and eliminates the shunt load or surge, to which most operators and owners of x-ray machines have been intimately introduced by transformer blow-outs.

The method and place of take-off to and return from the x-ray tube is not shown by this illustration. It is plainly evident, however, that both discs operate in the circuit, whether one or two tubes be in use.

7. SPHERE GAP. This machine is equipped with a sphere gap providing for the accurate measurement of voltage. These spheres are 12.6 C.M. in diameter.

One of these machines will be on exhibit at the Annual Meeting and will doubtless prove of unusual interest.

Acme Combination Table

THE first piece of apparatus placed on the market by the Acme X-Ray Company is a combination table for radiographic, stereoscopic and fluoroscopic work in any position or angle from the Trendelenberg to the vertical and counterbalanced in such a way as to make the hand raising gear mechanism extremely smooth in operation.

It is equipped with ball-bearings throughout and friction joints have been substituted extensively for hand lock screws, which makes for ease of operation and the saving of time.

For fluoroscopic work the screen and holder, which is adjustable to every possible angle, covers a very large fluoroscopic field, equal to two-thirds of the entire area of the table top.

Any part of the body may be radiographed without moving the patient as by means of an ingenious arrangement cassettes can be inserted at three different points along one edge of the table top, so they will center below the head or shoulders, the torso, or the legs, which ever desired, and just

NEW EQUIPMENT

as easily removed. This is a very necessary arrangement in stereoscopic work.

The combination head and shoulder rest and seat is instantly attached to any desired position.

Added protection against possible shocks is furnished by the specially constructed insulating tubes connecting the transformer with the high tension system.

The separate portable control stand is equipped with all necessary meters and switches together with a Coolidge transformer regulator and an auto transformer which will, without a separate means of adjustment, take care of any rise or drop in the line voltage between 100 and 120. The circuit breaker, which is also embodied in the control stand operates in such a manner as to open the main line circuit instantly in case of an overload caused by exceeding the limits of the tube or by the patient or operator coming in accidental contact with high tension wires. It also serves as a protection against burn-outs in the transformer.

The outfit will be supplied in various combinations from the plain tilt table to the complete unit and for use with either the radiator type or Universal Coolidge tubes.

Victor High Frequency Apparatus

IN the field of physiotherapy there is probably no modality that finds wider application than the high frequency current in its various forms.

The efficacy of the high frequency current was long ago established, and while at first its adoption in general medical practice was gradual, in recent years the medical profession has seen convincing results as obtained by the medical departments of the armies and navies of the allies, and today in the treatment of industrial injuries and diseases.

With the rapidly increasing use of this modality, there has been a demand for higher perfection of apparatus for its administration. To many physicians it did not prove its efficacy simply because of shortcomings in the apparatus itself, electrically and mechanically. This was indeed unfortunate, for the high frequency current is invaluable to practically every physician, a fact which is substantiated by those who have investigated, and used it over a considerable period of time.

Victor engineers have just accomplished further and important improvements in high frequency apparatus, as represented in the New Model "Wantz" and the Victor Portable High Frequency Apparatus. They mark definitely an advance in high frequency therapy, offering as they do the approved forms of current, unvarying in quality and under the finest regulation. These desirable and important features are realized with a control so simple that the physician can learn to operate the machine readily, and has to concern himself only with the therapeutics of the current.

THE NEW VICTOR MODEL "WANTZ"

This apparatus offers complete service, delivering every approved form of high frequency current, both Tesla and d'Arsonval. Heretofore the physician wishing to use both Tesla and d'Arsonval currents had to invest in two separate machines.

There are many important features in this apparatus, all of which are essential to the best results. Limited space prevents detailed description. Brief mention only of the range and nature of service this machine offers will be made.

The diathermy current is probably as widely used today as any other one of the high frequency modalities. Diathermy is synonymous with thermo-

NEW EQUIPMENT

penetration, or the treatment of deep-seated conditions with heat. In this instance the heat is conveyed electrically to the tissues in the affected part within the body. There is a mistaken idea that the d'Arsonval current delivered at an unusually high frequency is the ideal for diathermy, but it will be found that the resulting high heat confines itself largely to the surface of the part treated. Such machines, therefore, fall short in the treatment of the trunk or a heavy hip. From the Model "Wantz" is available a diathermy current (d'Arsonval) with the necessary high voltage which these other machines do not have, to carry the heat through to the part under treatment. Diathermy treatment of deep-seated conditions can not result in a full measure of success under the circumstances first mentioned.

A true Oudin current, absolutely free from faradic, is also available, with means of very fine adjustment. The cold spark is taken from the top of the Oudin resonator, and a d'Arsonval current, so that it is possible to do any form of electro-coagulation or bi-polar desiccation. The uni-polar spark is also available when that is desired.

Auto-condensation can be given with either Tesla or d'Arsonval current; both these currents, as above stated, being obtained from this apparatus, making it practically two machines in one.

In addition to the above mentioned modalities, this machine delivers currents for auto-conduction, effleuve, head breeze, fulguration (both superficial and orificial) and vacuum or non-vacuum electrode treatments.

The well known disc type spark gap, as used exclusively in the Model "Wantz" is one of the most important developments in high frequency apparatus in recent years. It permits of all-day service, without having to rest the machine between treatments,

and with each setting the resulting current will be delivered without varying in quality throughout the treatment seance. This in contrast with the inconsistencies of spark gaps of previous design.

The elimination of all danger of grounding through patient, and completely enclosed switches and spark gap to prevent accidental contact by patient or operator are other desirable features of this apparatus.

NEW VICTOR PORTABLE HIGH FREQUENCY APPARATUS

This machine also offers a complete range of high frequency modalities, but differs from the larger apparatus in that it is restricted to intermittent service. Being of the portable type, this advantage is obtained at the sacrifice of the all-day service, as provided in the Model "Wantz."

The proportions of this portable machine are to allow it to be conveniently moved to the bedside of the patient in the hospital or home. In spite of its compactness, the machine has a capacity considerably greater than many machines on the market of the stationary type.

The various modalities delivered by this portable outfit are as true in form as those obtained from the larger apparatus; in short, it is intended for serious work. It is a highly practical and efficient outfit for intermittent service. Where the number of office treatments require a machine to be running constantly during the day, the logical machine is then the Model "Wantz."

From this portable outfit the following modalities are obtainable: Electro-coagulation, with a current range even beyond the requirements; auto-condensation with both Tesla and d'Arsonval currents; diathermy, including treatment of deep-seated lesions; fulguration, superficial and orificial, either uni-polar or bi-polar; vacuum or non-

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vacuum electrode treatments in all forms.

Eastman Dental Film Developing Cabinet

THE Eastman Company has just put on the market a Dental Film Developing Cabinet which should prove mighty helpful and economical for dentists and others who feel that they should do x-ray work but have no dark room space or hesitate to incur the cost of properly equipping a dark room.

The cabinet in question is a complete miniature dark room with tank development, safelight, and provision for circulating water.

The tank unit consists of an outer tank of monel metal and contains two smaller monel tanks with space between for washing. Four developing hangers are included, each holding ten dental films, so that the unit affords ample facilities for a large amount of work.

Any Eastman dealer will be glad to demonstrate this unit.

Wm. Meyer Company Transformer

STRIVING to accomplish the demands of the roentgenologist for accuracy, safety and convenience in a modern transformer the William Meyer Company of Chicago lately announced one in which the milliammeter and kilovolt meter, both tied into the high tension circuit and the latter graduated as a back-up meter, are

mounted on the low tension switch-board alongside the primary controls.

There is, of course, no question about the convenience of having these two instruments so accessible and so easily readable. But whether this company has evolved some method of overcoming the inaccuracy of distance between the measuring instruments and the terminus of the high tension circuit at the point of discharge into the x-ray tube cannot be determined without thorough examination. It may be said, in all fairness, however, that Mr. Meyer assures us such is the fact.

Frankly, the statement that the kilovolt meter is graduated as a back-up meter suggests that this company has not yet gained an absolute instrument of precision. The problem of back-up is so variable, considering the many inconstant factors, that it is doubtful whether this principle holds the correct method of approaching the solution.

But the Meyer Company may have solved this question, wherefore we reserve final decision. If it has solved it, then it will be our great pleasure to comment on this particular piece of apparatus in detail to the point of specificity. That it is impossible to do without complete data and an opportunity for examination, demonstration and study.

One of these transformers will be on exhibit at the annual meeting, where members and visitors will have ample opportunity to look it over and get first-hand information.



ABSTRACTS AND REVIEWS

Surgery Versus Roentgen Ray in the Treatment of Hyperthyroidism. G. W. Crile, M. D. Journal A. M. A., October 22, 1921.

THE treatment of Graves Disease is practically limited to two methods, viz., surgery and roentgen ray. In defense of surgery the writer elects to show that operative discomfort is probably less than transportation to and from the x-ray therapy room. The average period of disability after thyroidectomy is thirteen days and the mortality rate is one per cent. He believes that the end results are better. The review of 208 articles of the use of the roentgen ray shows that at present there is no standardized method of roentgen treatment, hence no definite statistics of end results are available. The ray nearly always reduces the pulse rate promptly. There is a divergence of opinion as to the effect of the ray on the gland itself. The advantages are: no fatalities, no scars, no interference with the patient's occupation, and no pain. If unsuccessful surgery is still possible. He admits the advantage of the ray in the adolescent thyroid. He quotes Christie to show that thyroidectomy exerts greater immediate curative effect than the treatment of roentgen rays.

V. M. MOORE.

NOTE—The author has evidently overlooked microscopic proof of the action of radiation on the thyroid gland.—Ed.

Observations on a New Method of Roentgen Ray Therapy in Psoriasis.

BROCK at Kiel is treating psoriasis through the action of the x-rays on the thymus and found that the psoriasis either improved or got worse under treatment. The action of the ray is either stimulative or destructive and the satisfactory treatment consists in stimulation. Hence cases which were made worse at first were apparently due to over treatment, but these began to improve after six months, the result being apparently a paralysis of the gland action with subsequent regeneration and hypersecretion. They advise against giv-

ing a second dose within two months on account of the danger of cumulative action. This method of treatment gives better results than treatment of bone marrow or of large skin areas. The authors adopted an eight and one-half inch spark gap, 3 mm. aluminum, 5 milliamperes 2 minutes time 10-inch distance and with this formula treated twenty-three patients. Thirteen were markedly improved, and in five the eruption vanished completely. Recurrence often followed, but with less severity than the original eruption.

V. M. MOORE.

Radiotherapy in Painful Sacralization. Japiot in Lyon Chirurgical, July-August, 1921.

THE author observed six cases of very painful lumbar neuralgia and sciatica in which radiography revealed sacralization of the fifth lumbar vertebra, and in which all other treatment, including epidural injection, failed. These were subjected to x-ray treatment. The writer obtained complete cures in five cases and considerable improvement in one case, which was complicated by a cervico-bronchial neuralgia in addition to the lumbar condition. In one of his cases the painful condition had been of nine years duration, and was so severe that the patient was completely incapacitated and did not work for several years. Two treatments in two weeks enabled the patient to resume work, and freed him completely from his pain. None of the cases required more than three or four treatments. The duration of the illness did not seem to have any bearing on the response to the treatment. Nor does the character of the pain determine the quality and quantity of the treatments, as the most lancinating pains were stopped after the first light treatment.

All the author's cases were thoroughly studied and sacralization was found to be the only possible cause of the trouble.

Three of the cases presented besides the severe pain also slight sensory and trophic disturbances, and while the radiotherapeutic action on the pain was very rapid it took from

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several weeks to some months before the sensory and the trophic conditions came back to normal.

The technique is essentially the same as for sciatica. The rays are applied over the sacro-lumbar region, that is, over the area where the roots of the sciatic nerve take their emergence. About 2 or 3 H is given through 1 mm. aluminum filter. This is repeated in fourteen days. No more than 4 H should be applied in one treatment.

The writer offers no satisfactory explanation regarding the therapeutic action of the rays. He advances the idea that the rays besides having a general sedative action on the irritated muscles and ligaments resulting from a mechanically incorrect lower back, also may exert a direct action on the nerve sheaths.

A. M. PFEFFER.

Stimulative Irradiation of the Spleen in Obstetric and Gynecologic Cases. E. Vogt, Woman's Clinic of the Tuebingen Uni. in Mediz. Klin. Aug. 14, 1921.

THE fact that irradiation of the spleen raises the coagulability of the blood leads the author to apply irradiation as a therapeutic measure in various hemorrhagic conditions as well as a prophylactic measure previous to some surgical procedures. Stimulative irradiation of the spleen is followed by the highest coagulability in 10 to 15 hours, while its action is entirely over in three days. Purasz and Tichy irradiated their surgical cases the night before operation. The technique is very simple. The patient lies on the right side, the splenic area is outlined, a field of 10 by 15 cm is exposed, and 0.5 mm. zink and 1 mm. aluminum used for filter, one-third erythema dose is used for therapeutic action, and one-fourth for prophylactic action.

The writer found irradiation effective in 50 per cent of his sixty-eight cases, which consisted of various menstrual disturbances, such as menorrhoea, metrorrhagia, oligomenorrhoea, bleeding resulting from uterine displacements, from various pelvic inflammatory conditions, from pelvic tumors, and several cases of postpartum hemorrhage.

A number of gynecologic and obstetrical operations were almost bloodless following a prophylactic dose.

Tichy obtained similar results from stimulative irradiation of the liver.

A. M. PFEFFER.

Roentgen Diagnosis of the diseases of the Pancreas. Poeschel in Fortschr. a. d. Geb. d. Roentgenstr. Vol. XXVIII, No. 5.

ROENTGENOLOGICAL examinations for diseases of the pancreas are rarely used, nor are there any characteristic findings, but a number of signs may prove corroborative to the clinical picture. The following roentgen signs have been observed by the writer:

- 1—Formation of a high small stomach.
- 2—Bowing outward of the lesser curvature.
- 3—Formation of a filling defect simulating gastric carcinoma.
- 4—Reverse peristalsis.
- 5—Stenosis and displacement of the duodenum.
- 6—Widening of the papilla of Vater evident by its retention of barium after complete emptying of the stomach and duodenum.
- 7—Compression of the transverse colon.
- 8—Visualization of pancreatic calculi.

A. M. PFEFFER.

The Action of X-Rays and Radium on Bone and Cartilage During the Development Stage. G. C. Segale, Radiologia Med. 1921, No. 7.

THE following conclusions are based on animal experimentation by the author:

Even small doses appear to have a harmful action on growth of the limb if applied during the developmental age. If medium doses are applied the changes begin early, in less than four days, are not transient, and even increase. Growth ceases, the limb becomes shorter, bowing of bones may occur, the thickness of the diaphysis diminishes, and the muscles undergo atrophy. Later, in about 59 to 83 days, the structural changes are appreciable; there is almost complete absence of vascularization, changes in the bone lamellae, and checked ossification of the diaphyseal cartilage. During the developmental age the epiphyses are especially radiosensitive.

A. M. PFEFFER.

The Roentgen Treatment of Bone and Joint Tuberculosis. Prof. Stein in Mediz. Klinik, Nos. 33, 34 and 35, 1921.

AFTER emphasizing his claim that the great value of sunlight and artificial light in the treatment of bone and joint tuberculosis is in part due

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to the more penetrating ultra-violet rays, the author mentions the fact that various investigators, among whom are found Kirmisson, Iselin and M. Fraenkel, have used roentgen rays in these conditions since 1898. The writer is of the opinion that while the roentgen rays have a general beneficial effect equally with sunlight or any other artificial light, they seemed to exert a specific effect on tuberculosis tissue in the cases under his observation. A light dose of x-rays which would be stimulative to carcinomatous tissue causes the decomposition of the lymphocytic elements of the tuberculous tissue, and further application of the rays produces shrinkage of the same with its replacement by connective tissue.

The writer describes his technique as rather simple. He advises the use of a hard tube of about 9 to 10 Wehnelt, and 3 to 4 mm. aluminum filter. The choice of the rays depends upon the stage and character as well as the position of the lesion. Softer rays are used when the destruction and the resorption of the lesion is aimed at, and harder ones are used when it is desired to bring the shrinkage of the irradiated tissue. The dose is about 20 to 40 per cent of the skin erythema unit for one treatment. Such treatments are repeated at intervals so that the skin should only get one erythema dose in three to four weeks.

The writer combines his roentgen treatment with sun baths, artificial light baths, and the administration of cod liver oil.

Contrary to the opinion of Iselin, the writer obtained excellent results in tuberculosis of the shoulder, hip, and the ileosacral joints. Similar results were obtained in tuberculous spondylitis. The best results were obtained in the early stages of the disease, and the author recommends irradiation in those cases as the method of choice. Notwithstanding the warnings of some investigators who found, in the experimental work on animals, that the application of x-rays caused cessation of bone and cartilage growth, the writer never noted any such interference with growth in any of his numerous cases. On the contrary, he observed a rather stimulative action on growth in some of his cases.

In the cases under his own observation the writer found 50 per cent cures, 45 per cent improvements, and

5 per cent failures. Moll of the Kraske clinic had 60 per cent cures, and Strhmeyer of the Lexer clinic had 80 per cent cures. The writer claims that if the work would be limited to beginning stages only the percentage of cures would be greatly increased.

While operative measures have been found less necessary since the irradiation treatment has become more frequent, the author advocates the application of all useful orthopedic measures, except that when a cast is applied an opening should be made for the application of the x-ray treatments.

A. M. PFEFFER.

Sixty-five Cases of Cervical Ribs. I. S. Trostler, M. D., F. A. C. P. Medical Record, September 17, 1921.

THIS is a careful tabulation of the radiographic findings, with symptoms, clinical findings, and a brief history of each case.

The diagnosis was made by the referring physician in only twenty-six per cent of the cases. Neuritis and progressive muscular atrophy were the diagnosis in twenty-eight and nine cases respectively. Nine of the cases were examined for other reasons.

The cases numbered twenty-one males and forty-four females.

The number who had cervical ribs on the right side only was three, on the left side only four, and on both sides fifty-eight. Seven presented no symptoms.

The youngest patient was four and one-half years old, the oldest sixty-five years. The average age of the sixty-five was thirty-nine years.

The average duration of symptoms in fifty-eight cases was forty-five months.

Thirteen were operated, and all were improved or cured.

E. W. ROWE.

X-Ray Burns. Dr. Arthur Dean Bevan. Surgical Clinics N. A. August, 1921, p. 935.

THIS is one of the important and unusual problems in surgery arising in the last twenty-five years.

Most of the burns in x-ray workers are found on those who handled it before the days of protection. Occasionally burns present themselves coming from experts. X-ray burns in patients are still common, for many of the workers are not expert.

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One case presented is a young man of 25 who was treated for psoriasis. A massive dose was administered, which resulted in a burn six inches long and three inches wide over the anterior aspect of the leg. The original burn healed over, but the skin was low in vitality and sloughing occurred. The pain was so severe that he took morphine. There was a loss in weight and the nervous condition was affected. The burn was excised wide of the margin and down into healthy muscle and fascia. Thiersch grafts were used to cover the denuded areas.

The second patient was an old lady of 75 treated by x-ray for eczema. The burn was five inches long by two and one-half inches wide on the anterior surface of the leg. The patient had been bedridden for many months, chiefly on account of the pain.

The pain is a very important factor in x-ray burns, being like the pain of senile gangrene, due to obliteration of blood vessels and starving of the nerves of their normal blood supply. The pathology is practically the same. In x-ray burns about the anus the pain is agonizing and usually requires increasing doses of morphine to control. As soon as all the dead tissue is dissected out, the pain ceases.

This second patient was treated as the first case, and now, three weeks after operation, the wound has healed completely and the pain has ceased.

These burns should be treated early by excision and grafting. Out of twenty-five or thirty cases treated on his service, several developed malignancy. Severe burns such as these two patients had are not so likely to cause malignancy as the long-standing irritation in x-ray workers.

The x-ray should be used only by trained hands. Burns may occur even in the hands of the greatest expert. Early removal of the damaged tissue and skin grafting is the second lesson to learn. This not only cures the patient, but lessens the dangers of malignancy.

E. W. ROWE.

Diaphragmatic Hernia. P. E. Truesdale, Fall River, Mass. Jour. A. M. A. Sept. 24, 1921.

"HERNIA of the diaphragm is one of the concealed deformities which roentgenology has exposed for study and cure, essentially during the past decade." These are the opening

words of this article. The matter presented consists of a review of the literature, of the varieties of hernia, of the mechanism in diaphragmatic hernia, of the symptoms and diagnosis, and of the roentgen aspects.

Forty-three cases from battle wounds have been added from the recent war.

Prints from excellent roentgenograms illustrate some of the most interesting cases.

E. W. ROWE.

The Relative Value of Laboratory and Clinical Methods of Study in the Diagnosis of Tuberculosis. F. M. Pottenger. Am. Jr. Med. Sci. Sept. 1921, p. 352.

INTENSIVE study of the patient should come first, supplemented by laboratory study. The diagnosis should not depend on the laboratory findings, but these findings should be weighed along with those elicited by clinical methods and the diagnosis be based on the analysis and correlation of all the data obtained. The diagnosis should be the result of reasoning.

The most useful and most commonly employed methods of examination for pulmonary tuberculosis are:

1. Clinical history.
2. Physical examination.
3. Examination of sputum.
4. Roentgen rays.
5. Tuberculin test.
6. Complement fixation.

Sputum tests and the complement fixation test have many sources of error.

The roentgen ray may be used to a great advantage. To be of value in early tuberculosis it requires an expert and even in the hands of an expert the results are often doubtful. Except in the hands of genius it should never be relied upon wholly for a diagnosis. In conjunction with other data it is valuable. It should be used as a routine in the clinical diagnosis of all cases of pulmonary tuberculosis, and diagnosis made on the basis of all the data obtained.

E. W. ROWE.

Radium and X-Ray in Tumors of Hypophysis. Quick, D. Archives of Ophthalmology, v. 49, 1920, pp. 256-267.

DR. QUICK points out that, even with the advance made in pituitary surgery in the past few years, it does

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not represent by a wide margin the ideal treatment for tumors in this location; and consequently many other methods have been tried. During the past few years, x-ray and radium have been used more and more. While the results of this work to date are very incomplete and contradictory, reports from many who have been trying this method are encouraging. Reports from different observers show that the most marked improvement was the more or less complete disappearance of headaches, dizziness, nausea and vomiting. In several instances there has been decided improvement in vision.

Experiment in the use of radium, at the Memorial Hospital, New York, on three cases, showed favorable results and warrant them in looking forward to future work in this line with considerable optimism. Three factors stand out in favor of treatment by x-ray or radium: (1) There is no operative mortality. (2) Pressure symptoms respond much more promptly, without pain or inconvenience to the patient. (3) Radiation offers a hope to every case of pituitary tumor, whereas surgery is confined to a small group of hyperplasias and benign tumors. Kuttner reports the successful treatment of malignant tumor of the hypophysis with radium, and Gravezzensi one cured by x-ray.

E. W. ROWE.

Radium in Gynecological Service, St. Luke's Hospital. Harold O. Jones, Chicago. Surg. Gyn. & Obst. Sept., 1921, p. 409.

THE cases treated number 500.

1. Fibroids—120 cases.

In selected cases radium will control the hemorrhage, and cause retraction of the tumor in 90 per cent of the cases. The size should not be greater than that of a three months pregnancy. Only patients approximating forty years should be treated. Earlier surgical removal is advisable.

Dosage varies from 1,000 to 1,800 millicuries hours.

The menopause is more acute than normal, but yields to corpus luteum or ovarian residue. The uterus does not change much in size before the end of the twelfth week.

Repetition was necessary in seven cases.

Sixty-nine per cent were entirely relieved for over two years. Not

enough time has elapsed to report on 22 per cent.

2. Hemorrhages—129 cases.

Radium should not be resorted to until organotherapy has been given a trial. The effort should be made to produce only enough cessation for relief and not a permanent menopause. Radium is practically specific in the bleeding of menopause. Idiopathic bleeding is usually controlled.

From 750 to 1,000 millicuries hours should be sufficient. Begin with an initial dose and repeat in two or three months. The first menstrual period may be profuse, the second is less, and the third practically none.

Eighty-one per cent have remained relieved for over two years. Sixteen per cent have been relieved, but the time has been insufficient to justify a report.

3. Carcinoma—60 cases

Radium is a palliative agent of the greatest merit. As a curative agent it ranks at least equal to other methods.

Radium is inserted into the uterus. Needles are inserted directly into the tumor tissue. Emanations may be inserted into the malignant growth. The dosage is about 3,500 millicurie hours for the initial dose. The number of treatments varies after waiting eight to twelve weeks each time. Deep roentgen therapy is urged in conjunction with radium.

In thirty-five cases diagnosed as inoperable the benefit was great.

In forty-five cases radium was combined with surgery. Five cases are free after one and one-half to two years. The others have not been heard from or the time is too short to tell much about them.

4. Leucorrhoea—60 cases.

Leucorrhoea yields satisfactory results. Any gland or place harboring bacteria must be treated surgically.

5. Miscellaneous—100 cases.

These are mostly skin cases. Results are good.

Study of Liver Atrophy by X-Ray Examination. Dr. Geo. S. Strathy, Toronto General Hospital, Canadian Medical Association Journal, December, 1920.

THIS paper is based on the x-ray examination of the liver in forty cases of salvarsan poisoning presenting overseas work. The author takes up the method of measuring the liver, and discusses the difference between

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the x-ray shadows of normal and atrophic livers. The most characteristic sign of liver atrophy is the acute angle formed by the junction of the shadows of the upper surface of the liver and the vertebral column. This sign is corroborated by measurement of the liver diameters and comparison with the normal.

Decrease in the transverse diameter of the liver was more commonly found than decrease in the depth. This decrease is usually shown by the left border of the liver being shifted to the right rather than by the right border being displaced to the left. This shifting of the left border to the right gives rise to the acute hepatico-vertebral angle, and to a dome-shaped appearance of the upper surface of the liver.

This acute hepatico-vertebral angle was found in but one case out of a hundred normal individuals. It however may occur when the left lobe of the liver is displaced downward by fluid in the left pleura, as in pleurisy with effusion or haemothorax and also when a very large heart presses on the liver through the diaphragm.

The liver measurements are determined by fluoroscopy, rather than by radiography. At the end of expiration the upper and lower borders of the liver are marked on the skin in the right nipple line, and the depth measured at these two points. The depth of the normal liver, as determined by a large number of measurements, is five and one-half to six and one-half inches in the right parasternal line, and six and one-half to seven and one-half inches in the right nipple line. Measurements from left to right were not made, but would be advisable, as confirming the acute hepatico-vertebral angle caused by narrowing of the transverse diameter.

Atrophy of the liver, determined by fluoroscopic examination, has been found in cases of arsenical poisoning, catarrhal jaundice, and should be looked for in all cases of chronic dyspepsia, which often are slight cases of atrophic cirrhosis.

L. J. CARTER.

Ileo-caecal Regurgitation Symptom Complex. Dr. Wm. Goldie, Toronto, Ont. Can. Med. Monthly, April, 1920.

THE writer analyzes a number of gastro-intestinal examinations and attempts to show that there is a

symptom complex definitely related to ileo-caecal regurgitation as apart from the symptom complex associated with organic ileo-caecal stasis.

In the series examined there was function fault at the ileo-caecal valve, as evidenced by ileal content in the morning after an evening barium meal, and by ileo-caecal valve incompetence for the barium enema.

With this function fault was associated the following symptom complex:

- (1) Distress in lower abdomen most marked in right lower quadrant.
- (2) Loss of appetite.
- (3) Auto intoxication syndrome—tired, weak, pale, etc.

This symptom complex and this function fault might conceivably be associated with either stasis or regurgitation at the ileo-caecal valve. The factor, however, that points to regurgitation rather than stasis is the time of occurrence of the symptoms. It is on awakening and before breakfast that the distress and the gastric symptoms are not evident. During the forenoon they lessen or disappear. This time of symptom occurrence is different from ileal stasis. In the latter the distress is complained of after the mid-day meal, and if the mid-day meal is omitted there is no distress. So that the association must be with ileo-caecal regurgitation and not with ileo-caecal stasis.

Of course, it is not inferred that ileo-caecal regurgitation is the sole cause of the symptom complex. For ileo-caecal incompetency occurs so frequently without symptomatology, being found in one out of every six gastro-intestinal examinations. There possibly is a common cause of both the regurgitation and the symptom complex, such as defective innervation, general disease, or physical or chemical influences from the distal colon.

Operative reconstruction of the ileo-caecal valve has not proven a success. Medical treatment consists of small doses of saline, three or four times a day, an enema at night, means to relieve the nervous tension, and regular physical exercise.

L. J. CARTER.

Page Sixty-seven

**STATEMENT OF THE OWNERSHIP,
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Of Journal of Radiology, published
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IOWA CITY, U. S. A.



Announcement of Merging of Victor Electric Corporation with X-Ray Interests of General Electric Company

An arrangement has been completed which took effect October 1, 1920, under which the entire business of the Victor Electric Corporation and X-Ray interests of the General Electric Company have been merged in a new corporation formed for the purpose and known as the VICTOR X-RAY CORPORATION. The new company, has exchanged its capital stock for the X-Ray patents and good will of General Electric Company and for the assets and business of the old Victor Electric Corporation.

The formation of the new company will result in full manufacturing, engineering and research co-operation between Victor X-Ray Corporation and General Electric Company with respect to X-Ray problems. It will extend further the usefulness of the two companies and consequently, present needs for Coolidge tubes and other X-Ray devices will be adequately met.

The executive, administrative, engineering and sales staff of the old Victor Electric Corporation will remain practically unchanged. Mr. C. F. Samms becomes President and General Manager. Mr. J. B. Wantz retains full charge of manufacturing and designing. It is contemplated to bring about a complete co-ordination of the entire Victor Corporation organization with the research and engineering organization of General Electric Company with as little disturbance of the old relationships as possible.

Dr. W. D. Coolidge of the research laboratory of General Electric Company becomes Consulting Engineer of the Victor X-Ray Corporation. Mr. C. C. Darnell of the research laboratory of General Electric Company becomes the Commercial Engineer of the Victor X-Ray Corporation. Mr. W. S. Kendrick, who for many years had charge of the commercial sale of the Coolidge tube, will be General Sales Manager. Mr. L. B. Miller remains General Manager of Agency Sales.

The Victor X-Ray Corporation will continue to carry out the same liberal policies and practices toward the X-Ray trade that have already been established by the General Electric Company.

The primary purpose of this merger was to co-ordinate the efforts of the best and most constructive elements in the research, engineering and commercial divisions of the X-Ray field to the end that users of X-Ray equipment might be served in the best possible manner, and assurances are given by the officers of the new corporation that the ideal toward which they intend to strive is 100% service.

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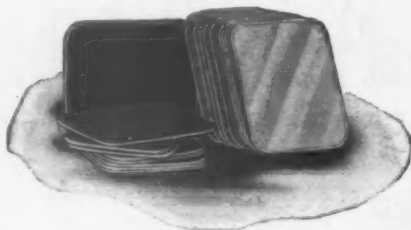
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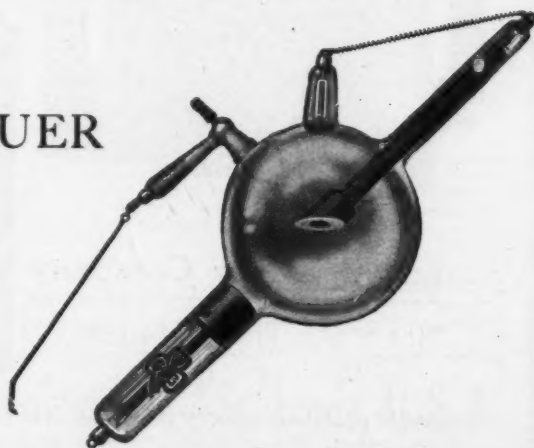
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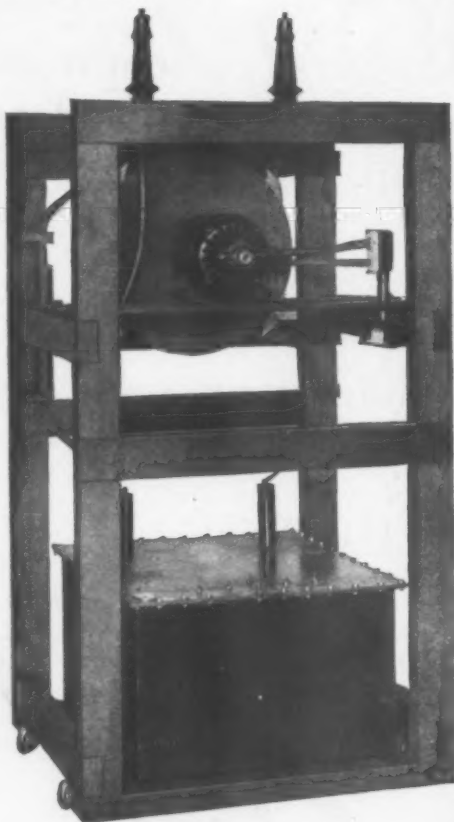
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
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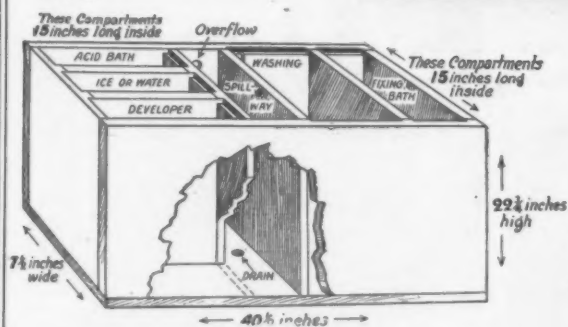
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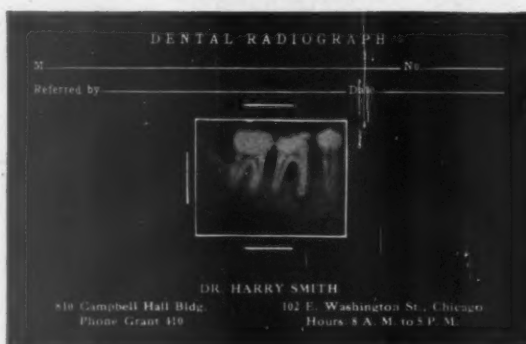
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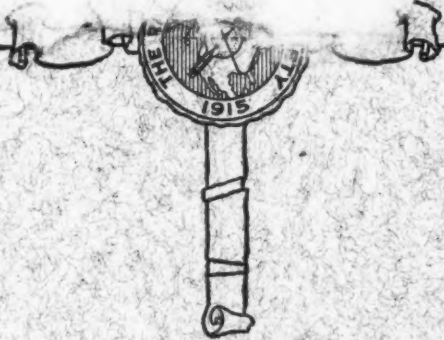
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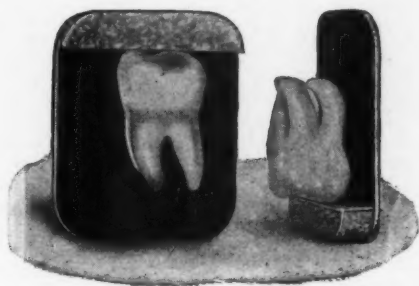
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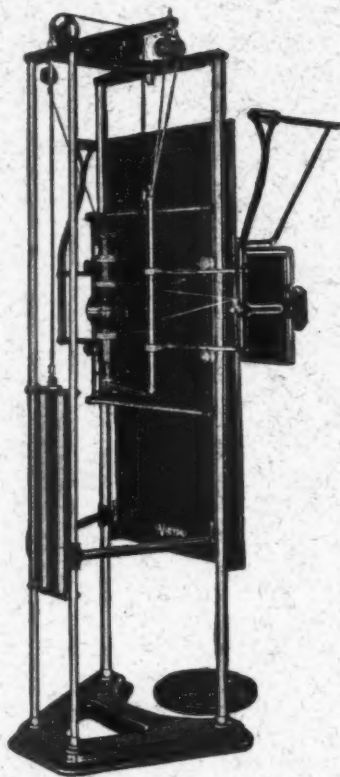
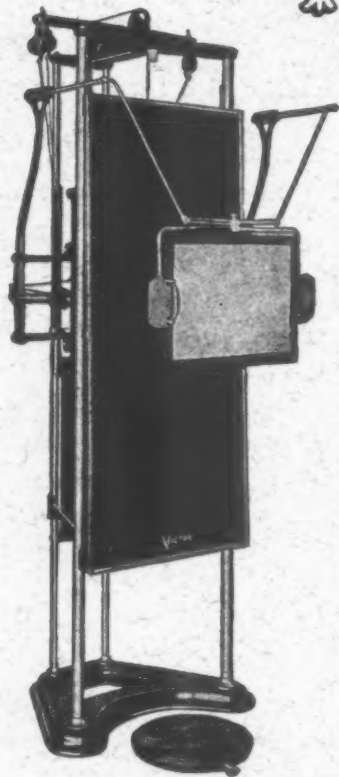


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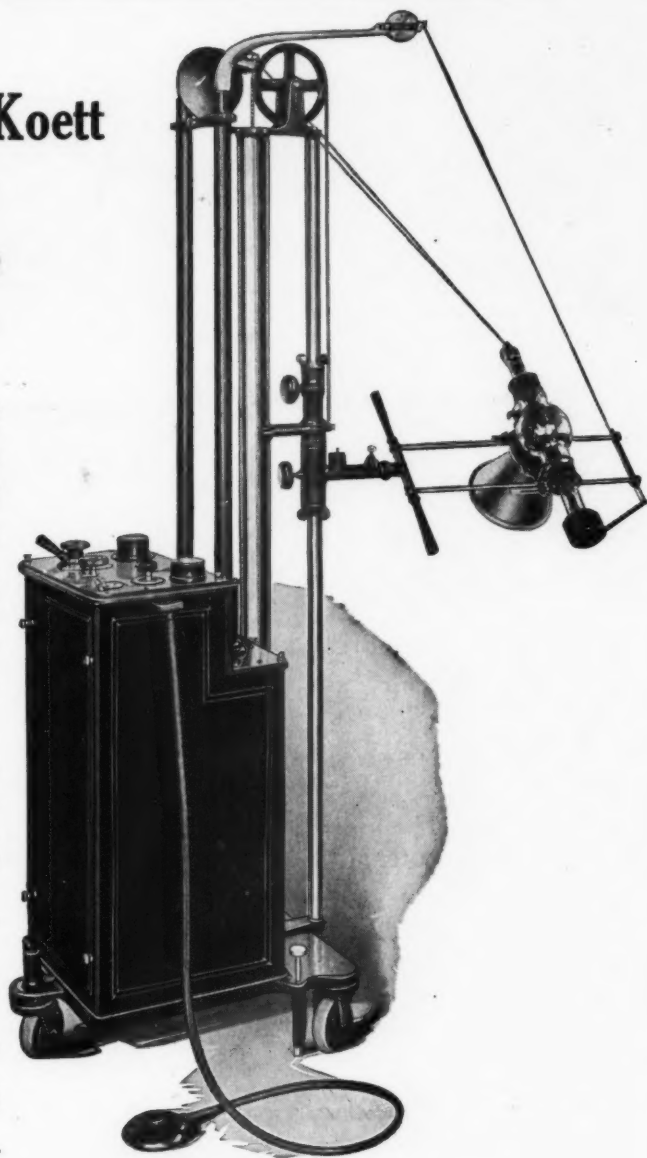
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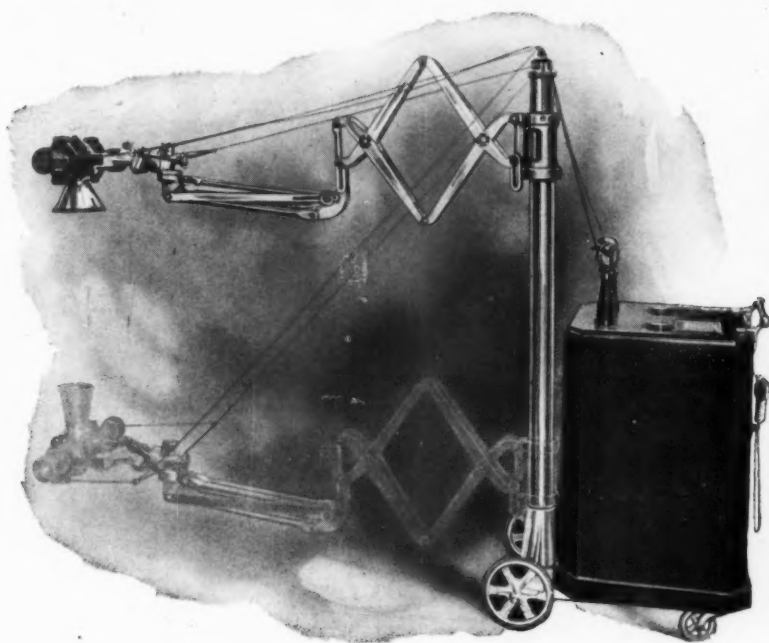
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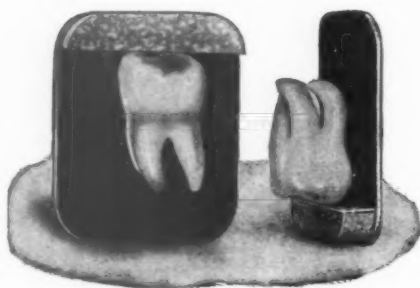
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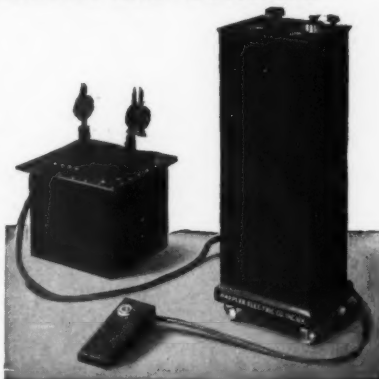
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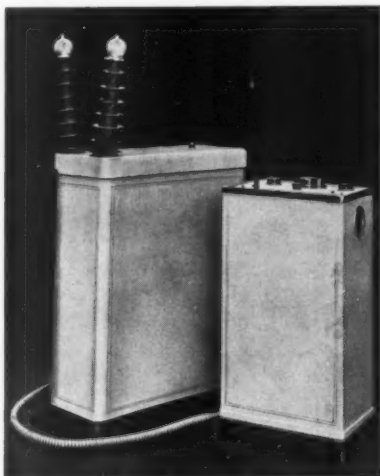
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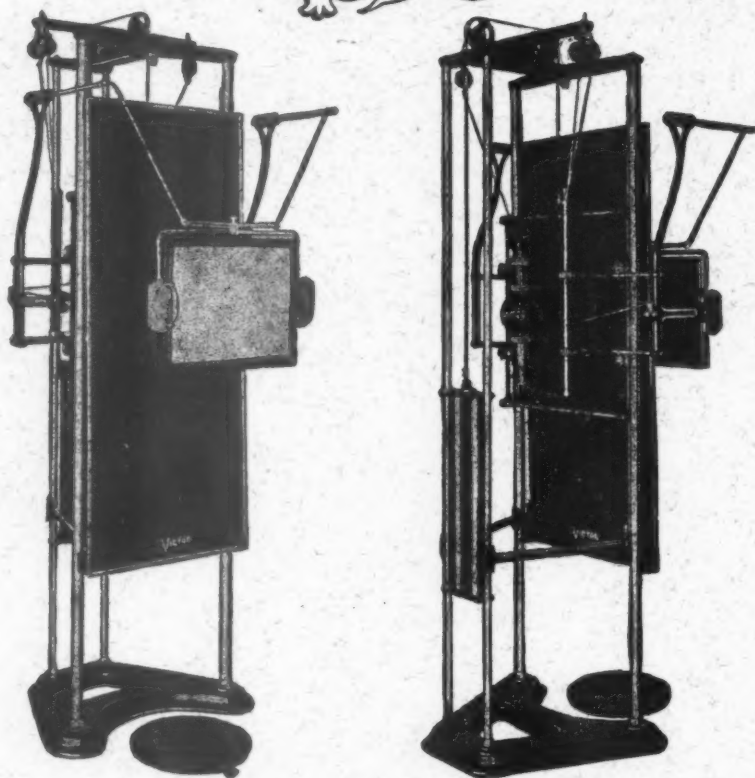


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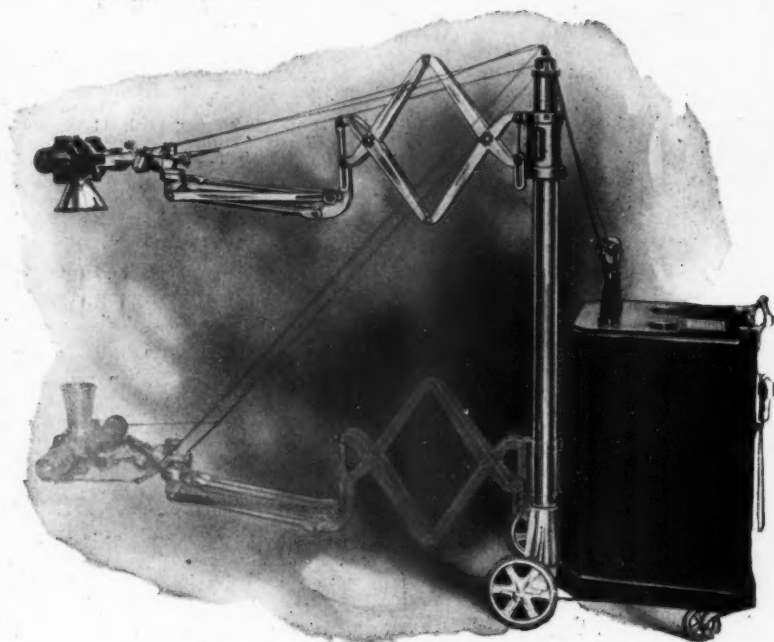
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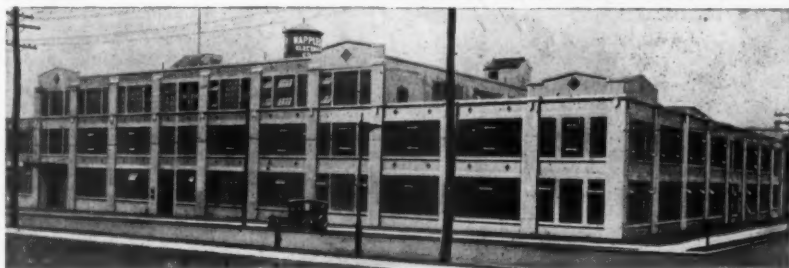
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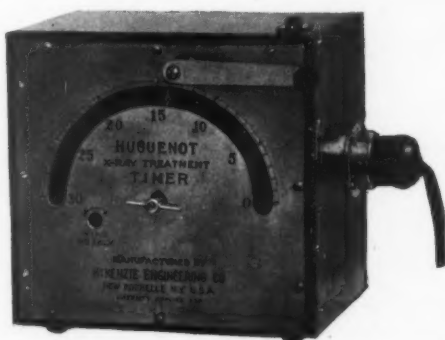
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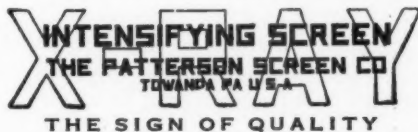
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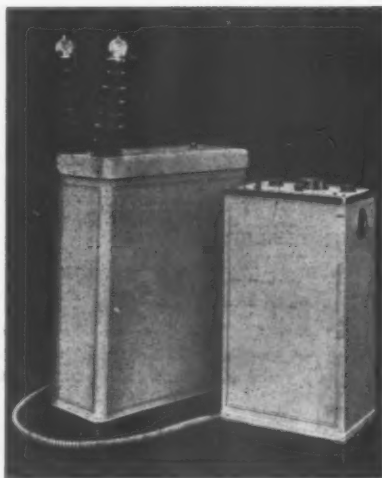
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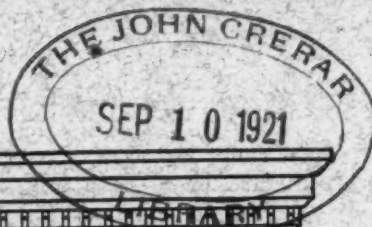
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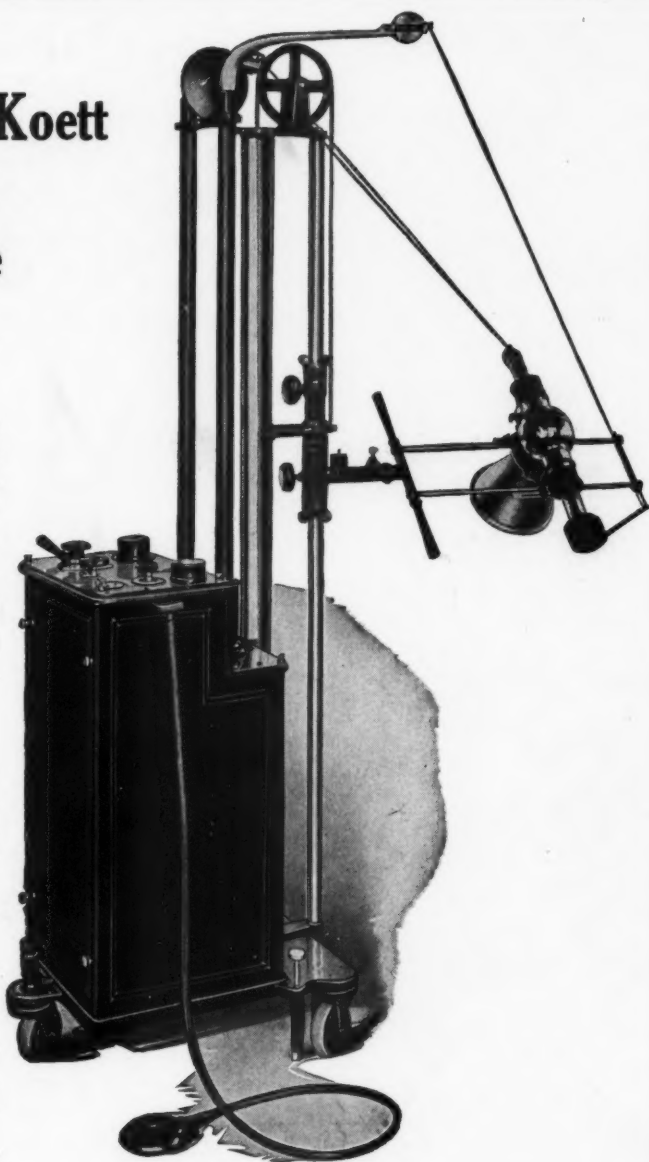
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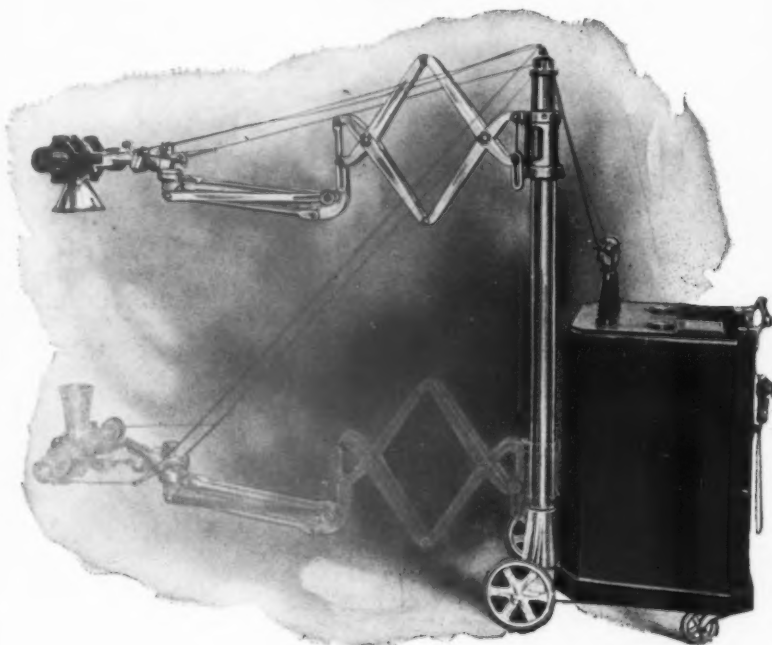
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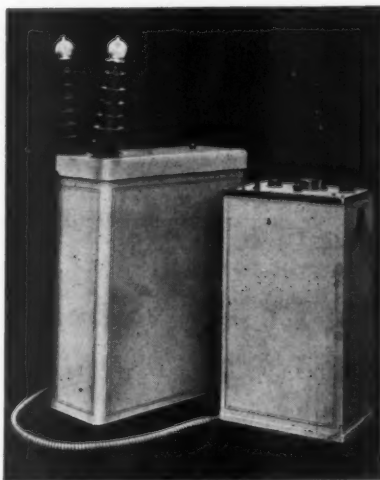
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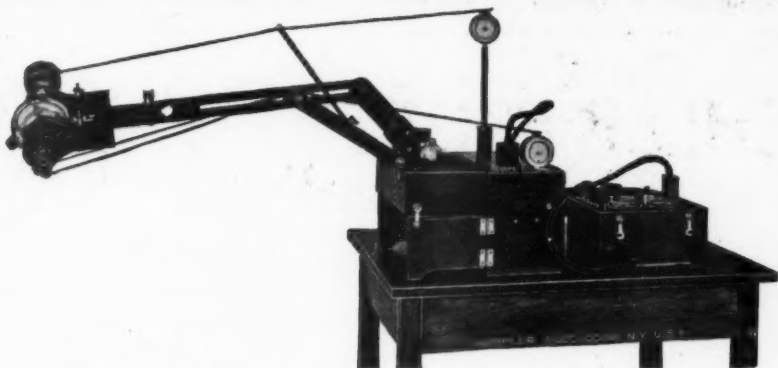
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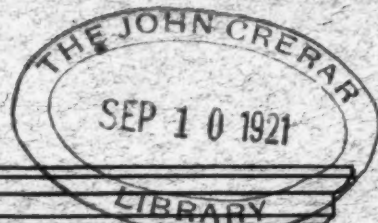
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THE JOURNAL OF RADIOLOGY



VOL. II

No. 7

August, 1921

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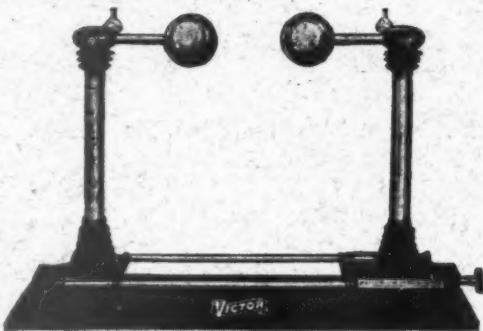
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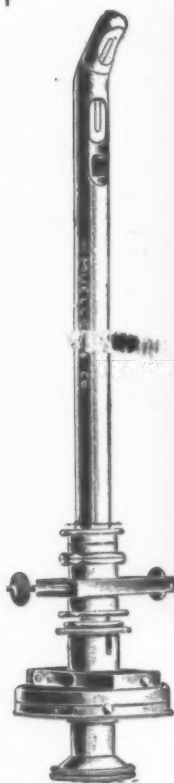
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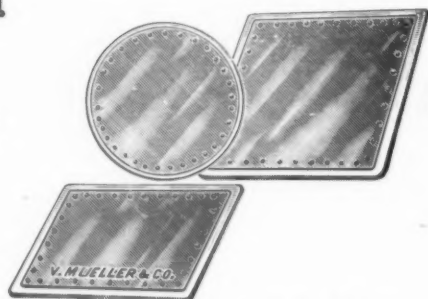
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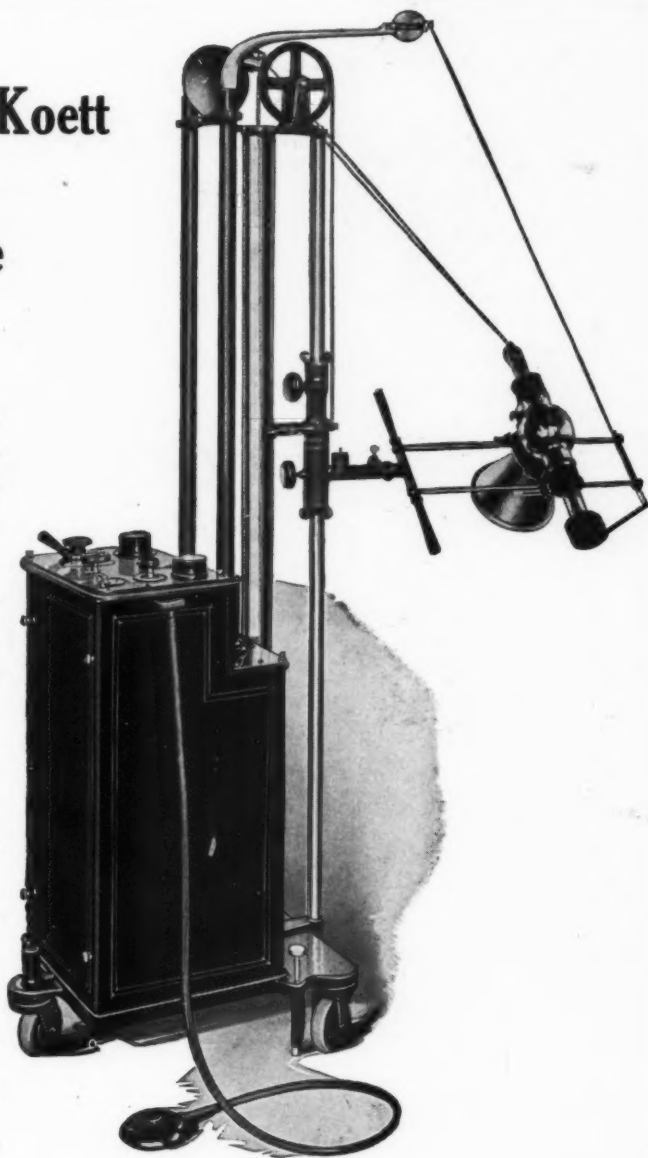
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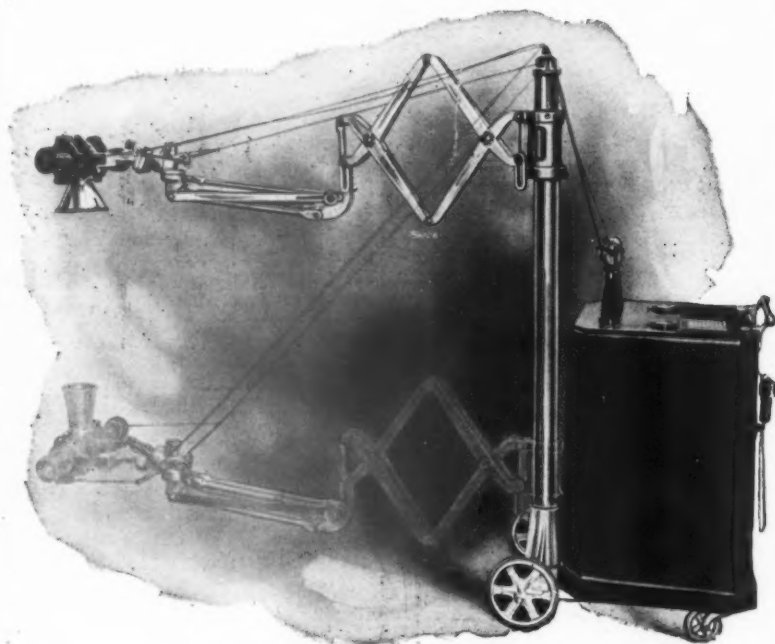
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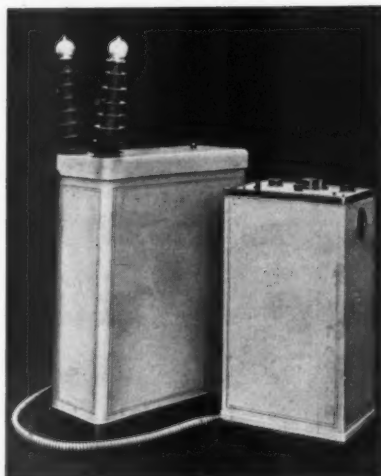
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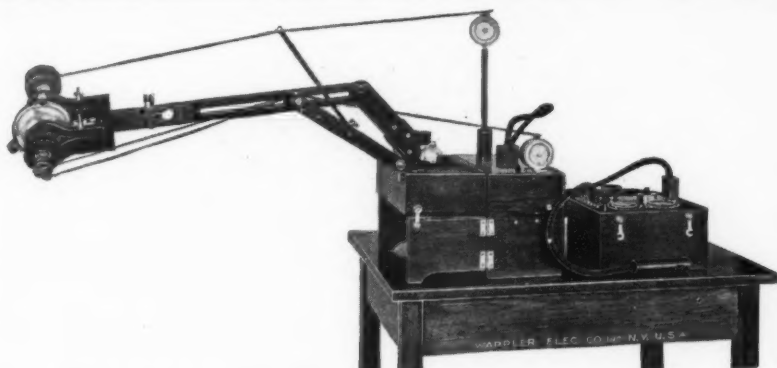
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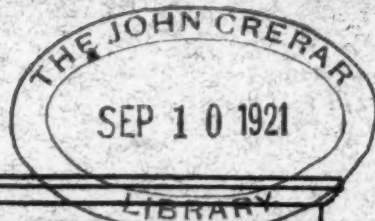
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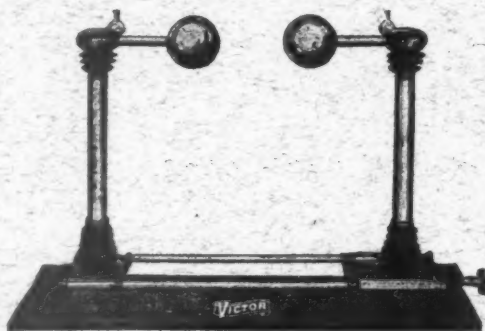
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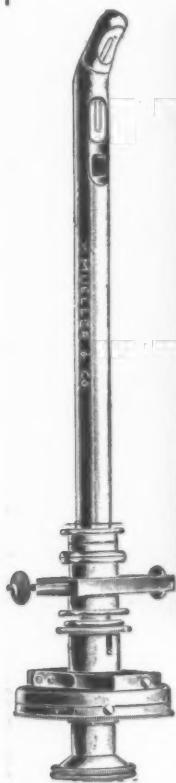
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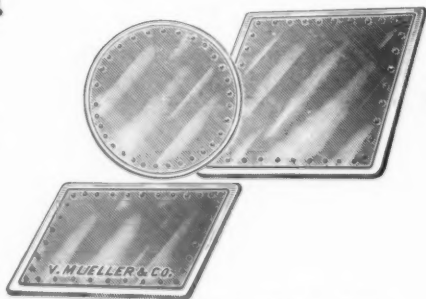
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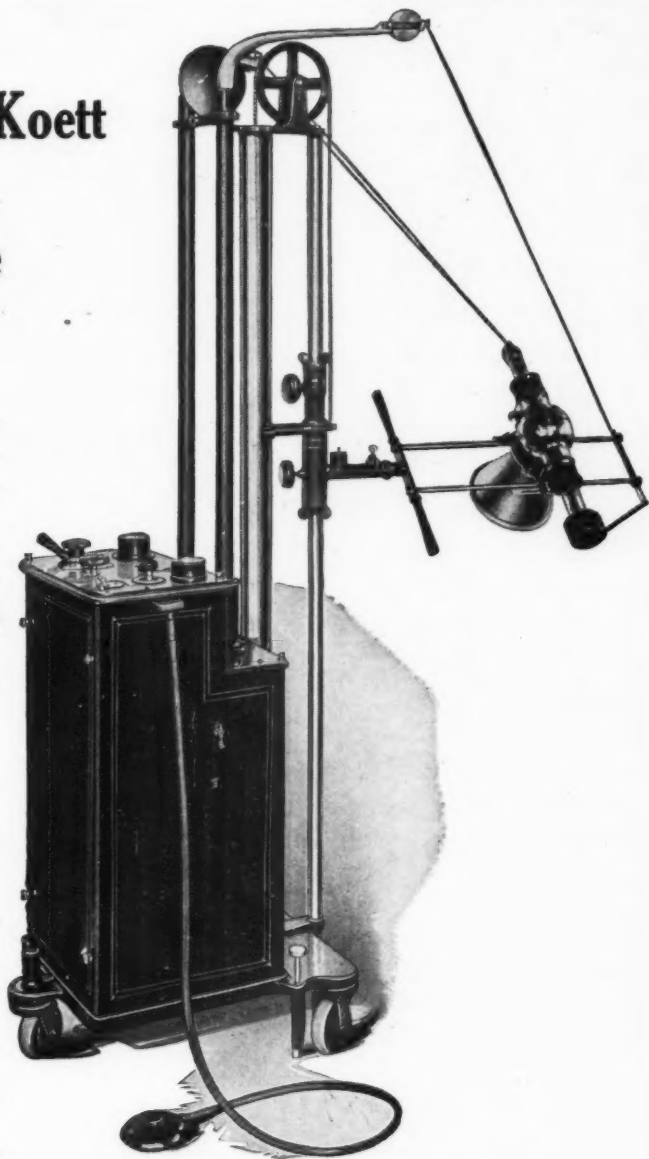
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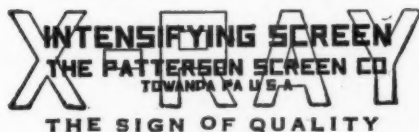
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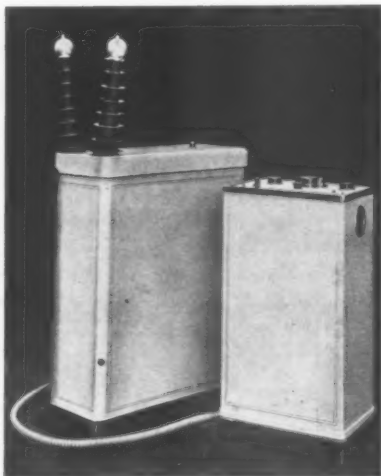
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VOL. II

No. 9

October, 1921

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The Bucky Diaphragm Table

An Added Advantage to Users of Victor Potter-Bucky Diaphragm

Fig. 1

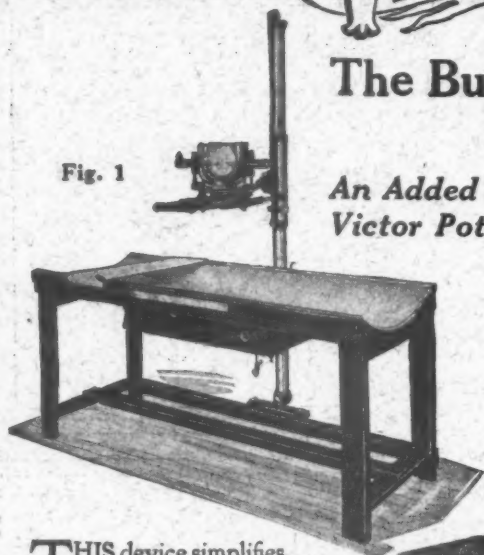
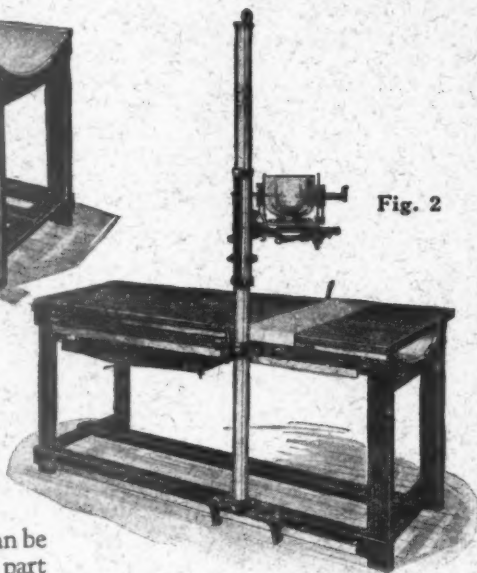


Fig. 2



THIS device simplifies to the utmost the use of the Potter-Bucky Diaphragm.

The troughed top corresponds to the top of the original Victor Diaphragm, but, as seen in Fig. 1, this trough extends the entire length of the table. With the patient on the table, the diaphragm and tube stand can be moved to position so that any part of the body can be radiographed without having to move the patient.

The Diaphragm and Tube Stand being locked together, they move in unison, so that regardless of position the tube is always in exact center with the Diaphragm.

This table will also serve for radiography without the tube stand, simply by adding the false top as shown in Fig. 2. In this instance the Diaphragm is released from the tube stand and the

latter operates independently. Thus the table can be used as a combination unit. Represents one of the most practical devices ever offered for radiographic diagnosis involving the Potter-Bucky Diaphragm. Those already equipped with the Victor Diaphragm and Victor No. 3, 6 or 8 Tube Stand can purchase the table only and readily adapt them for these purposes — another instance of standardization in Victor apparatus.

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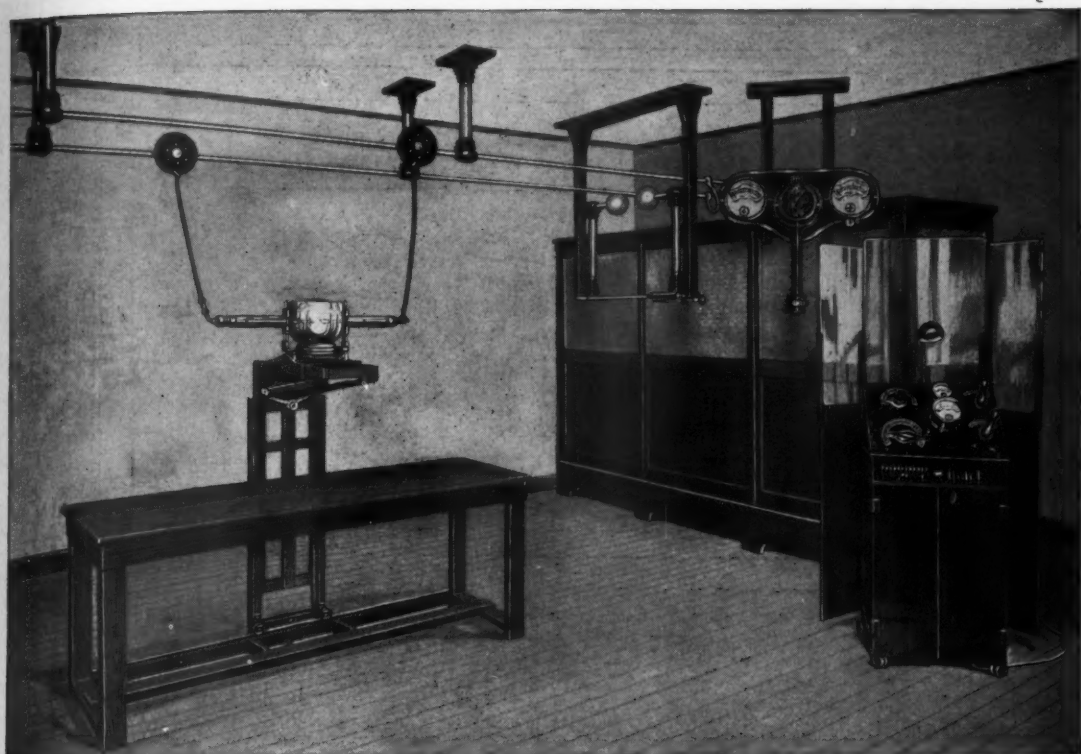
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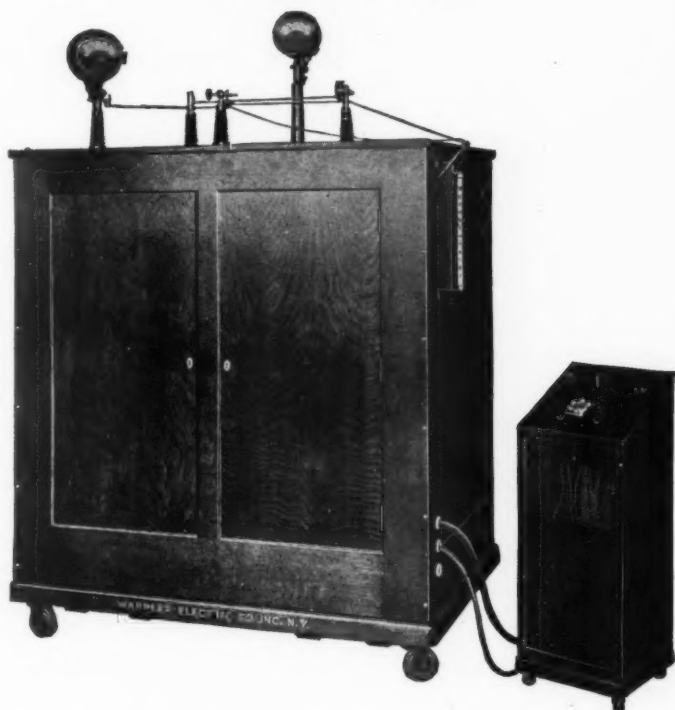
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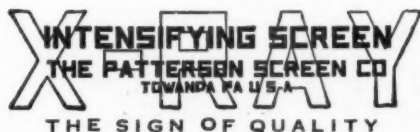
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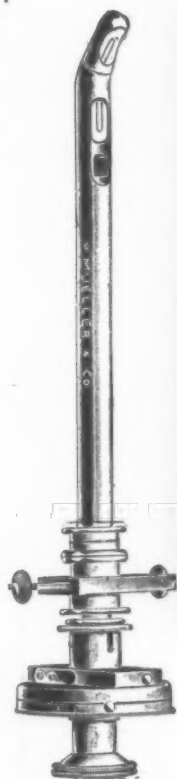
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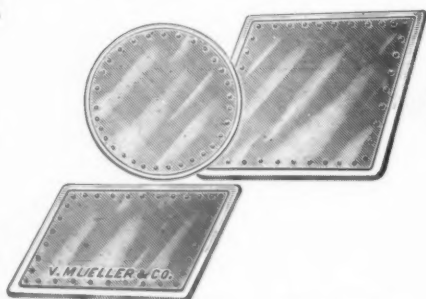
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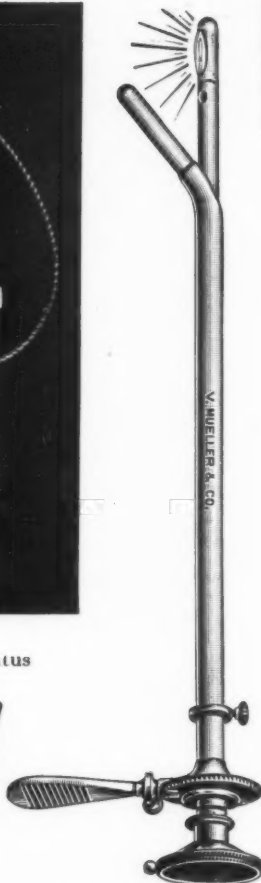
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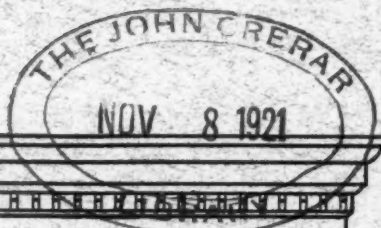
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The Bucky Diaphragm Table

An Added Advantage to Users of Victor Potter-Bucky Diaphragm

Fig. 1

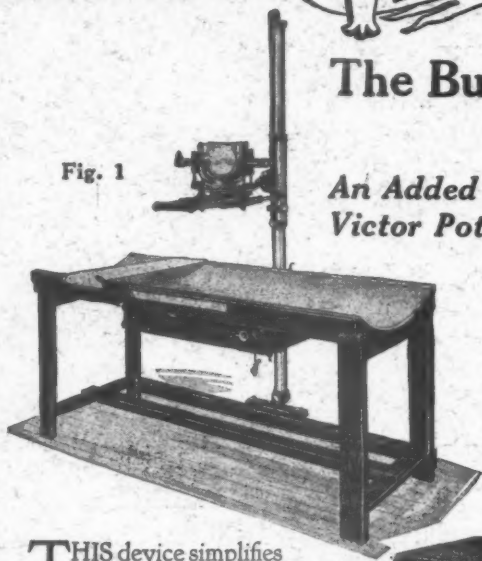
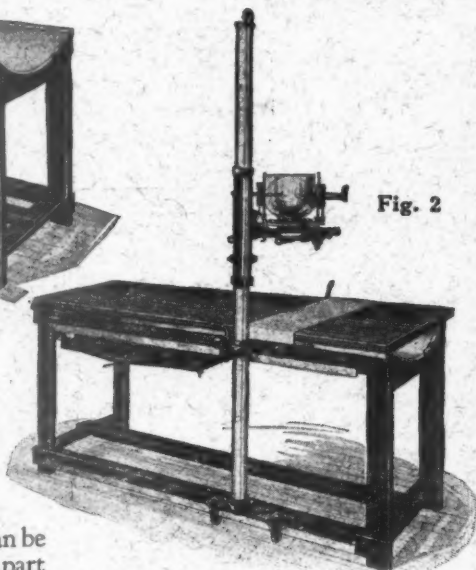


Fig. 2



THIS device simplifies to the utmost the use of the Potter-Bucky Diaphragm.

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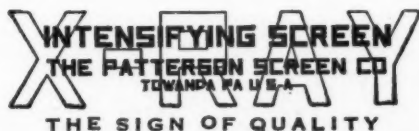
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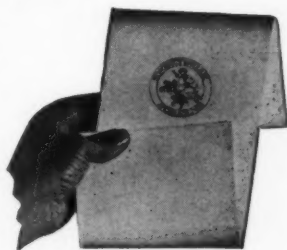
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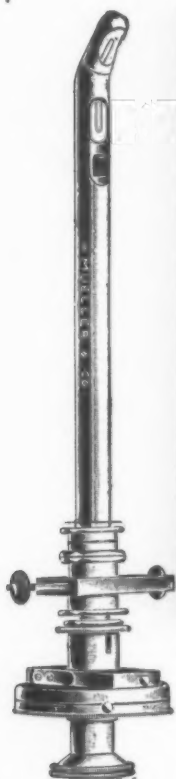
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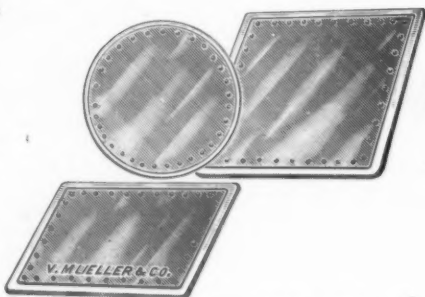
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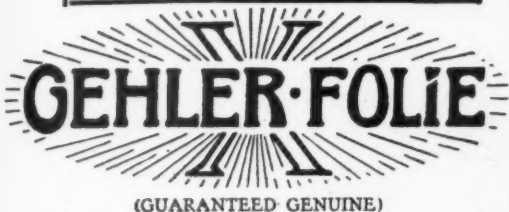
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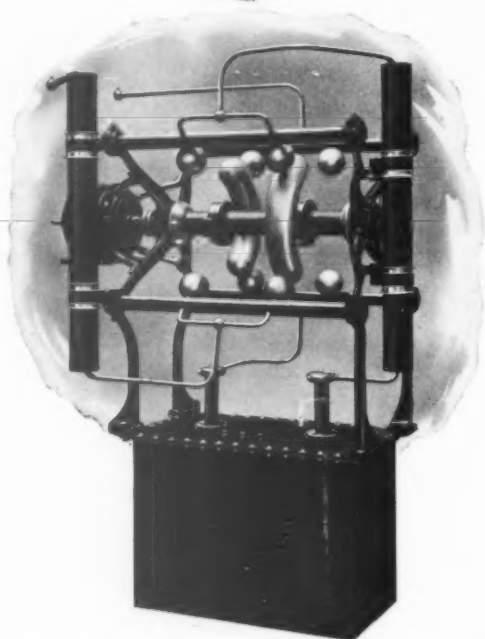
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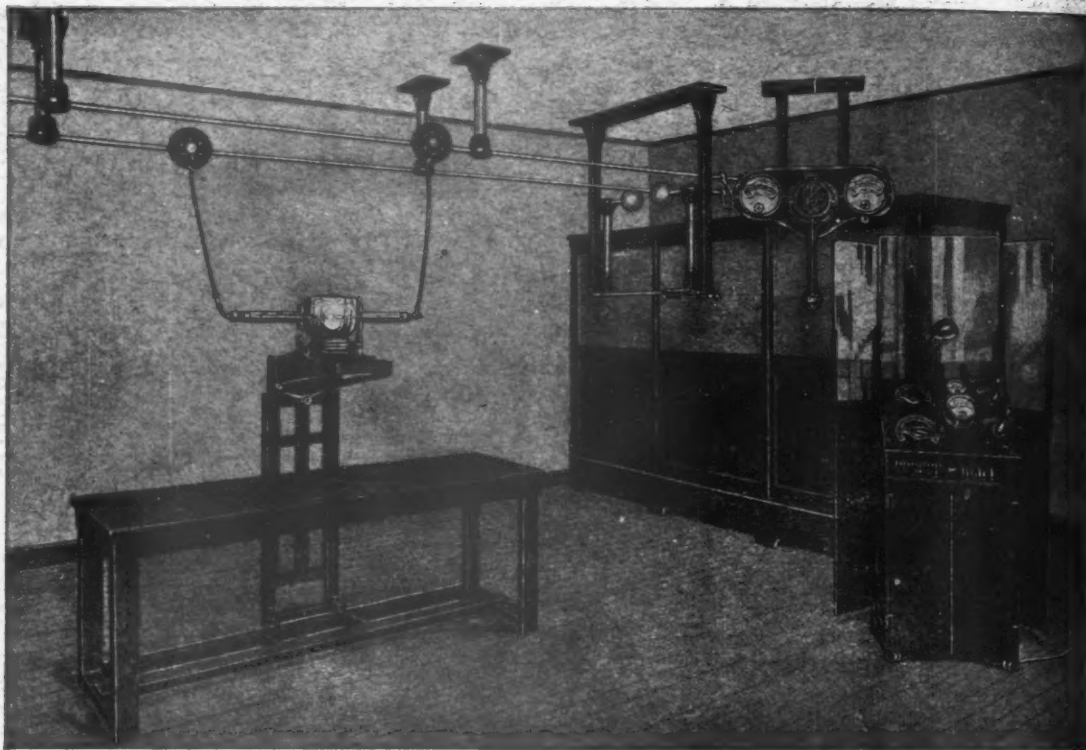


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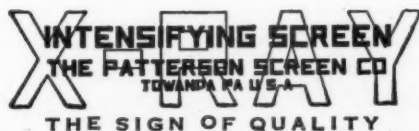
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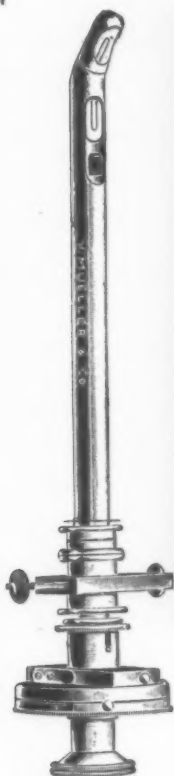
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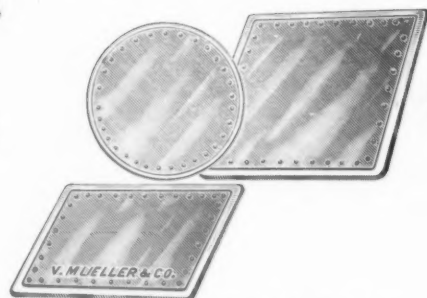
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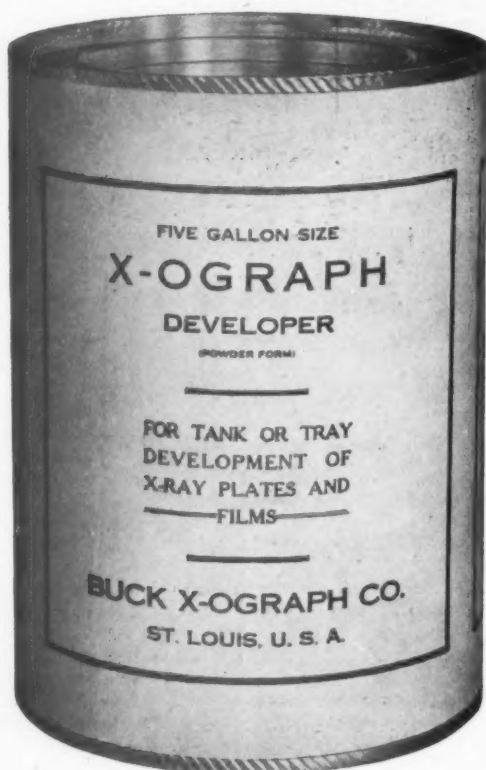
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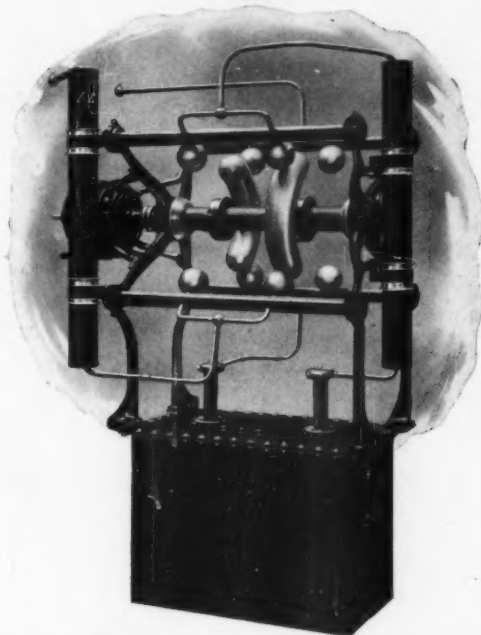
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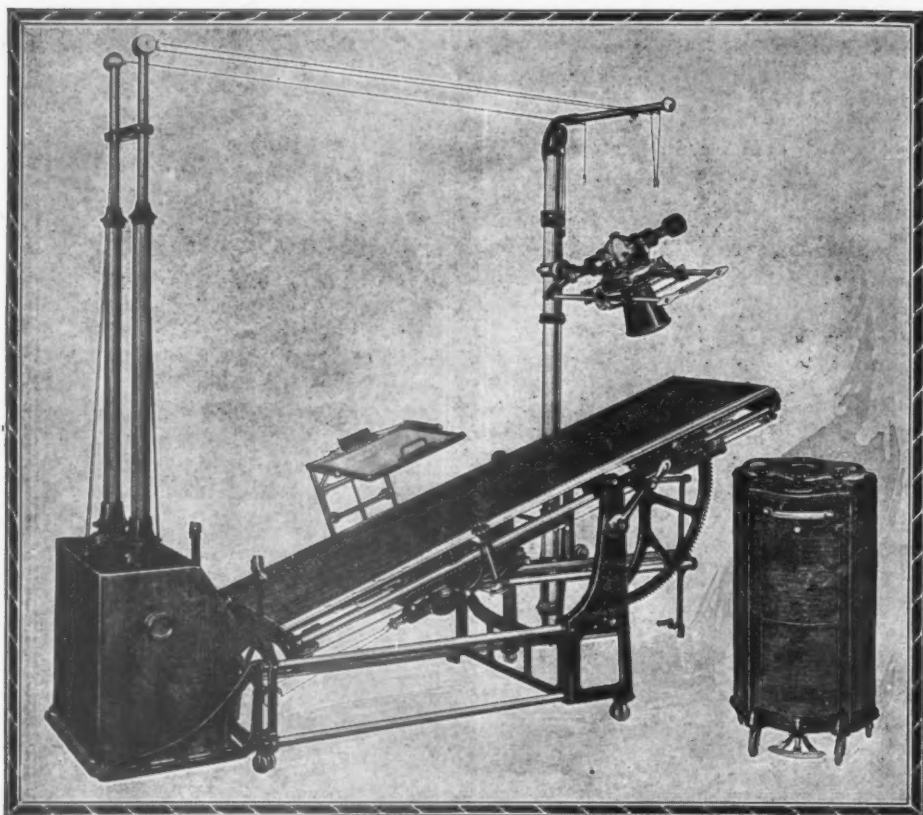
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The rectifying unit, only, is illustrated herewith and we invite you to write for full explanation and illustrations of complete machine.

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Friction joints substituted for hand lock screws.

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This apparatus designed for distant control has all meters, kilovolt meter, Coolidge filament meter and milliammeter mounted on the low tension switch-board where all instruments are read direct.

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The new and special feature of this apparatus is the Rotary Wave selector—a new principle of rectification which makes it possible to deliver directly from the transformer a uni-directional high tension current. It permits the construction of a machine less than one-third the size of machines of corresponding capacities. The Intermediate with Rotary Wave selector delivers current at a nine inch gap for therapy and at a six inch gap for radiography and fluoroscopy with regulation in steps of one-half inch down to a three inch spark gap.

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We will have this equipment on exhibit at the meeting of The Radiological Society of North America.

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NEW SPHERE GAP FOR ACCURATE READING OF HIGH VOLTAGE. It has a **REMOTE** control and is a direct reading on **LOW** voltage switch board. (Patent pending.) Delivery 8 weeks.

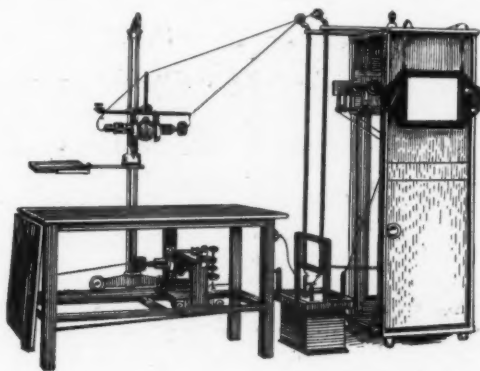
NEW SYNCHRONOUS MOTOR TREATMENT TIME SWITCH. No clock to forget to wind, reset instantly, treatment can be interrupted and yet cut-off at time set (Patent pending). Price, \$75.00. With contactor, \$110.00. Delivery 4 weeks.

NEW VIBRATING POTTER-BUCKY DIAPHRAGM. Motor operated. It is **FLAT**. It is built without any dingle bells or flashlights to observe, simply start motor and make exposure when you are ready. Price \$200.00. With contactor, \$235.00. Delivery 8 weeks. (Patent pending.)

THE 20" SPARK INTERRUPTERLESS MACHINE that we are installing for the General Memorial Cancer Hospital, New York City, is a machine made especially for this work and not a combination of previously used parts. The **TERMINAL** of the filament transformer also acts as one of the **PRIME COLLECTORS**. $1\frac{1}{2}$ " brass tubing runs directly from the prime collectors of the machine to the terminals of the X-Ray Tube. The tube box is lined with $\frac{1}{4}$ " thick **METALLIC LEAD**. The table top is made of wood with proper insulation and mounted on a pedestal that is adjustable for height and angles. There is an **ACCURATE** overload circuit breaker. To Operate: The lead lined tube box **MUST** be closed. Operator **MUST** keep hand on operating switch. If anyone comes within a certain distance of the machine when operating it **INSTANTLY** stops; the operator has to reset protective device.

INVESTIGATE THE X-RAY and electrical **PROTECTION** afforded operator, patient and assistants before buying a 20" Spark Machine. The **CAREFUL** buyer is our customer, because he considers the reputation of the manufacturer as well as the apparatus. **FORTY-TWO YEARS** in business and at the **SAME** bank, assures you of our reliability and responsibility. The apparatus speaks for itself, **SIMPLE, ACCESSIBLE**, and so free from complications that we guarantee **ANY** electrician can install it. An apparatus which is so **COMPLICATED** that it is necessary to have a **SPECIALLY** trained expert to install it is sure to **REQUIRE** a service man to keep it going. Corporations exploiting the **SERVICE** man will tell you that it cannot be done. Well, we are doing it **EVERY** day. We have many other new devices and will be glad to answer any communication.

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SWEETBRIAR SCREENS ARE ABSOLUTELY GRAINLESS

Do YOU Know
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Of course your intensifying screens get soiled - that is unavoidable - and then the quality of your negative suffers. But if your screens are SWEETBRIARS, a little dirt is a small matter, for with warm, soapy water and a soft cloth it can be removed, the screen can be wiped dry with a clean, soft cloth, and they will be as good as new. And the best of it is that the process can be repeated over and over again, for the longer you use SWEETBRIAR SCREENS, the harder they become and the more easily they can be washed.

This quality in SWEETBRIAR SCREENS is not due to a coating on the surface, but to the composition of the fluoroscopic coating, and the screen is therefore not slowed by reason of being washable.

PLEASE NOTE that the prices charged for the *grainless, washable* SWEETBRIAR SCREENS are no higher than the usual standard prices on screens.

The enlarged manufacturing facilities for which we made arrangements last summer in our present laboratories have proved entirely inadequate for the volume of business which has come to us, and we have been forced to purchase another plant large enough to admit of necessary expansion.

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Regular grid ratio 1:4, giving excellent general work with reasonable exposure. Finer or coarser ratio grid furnished at same price.

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FLUOROSCOPIC BUCKY DIAPHRAGM, used behind the Fluoroscopic screen to get sharp, clear images when fluoroscoping heavy patients. Makes the "whopper" seem thin. Cuts off secondary radiation, making diagnosis comparatively easy. A wonderful aid in abdominal work.

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	Single Screen	Washable Pair		Single Screen	Combination Cleanable Pair
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11 x 14.....	44.40	65.40	48.40	70.90	84.40
14 x 17.....	61.20	93.20	67.20	103.20	121.20

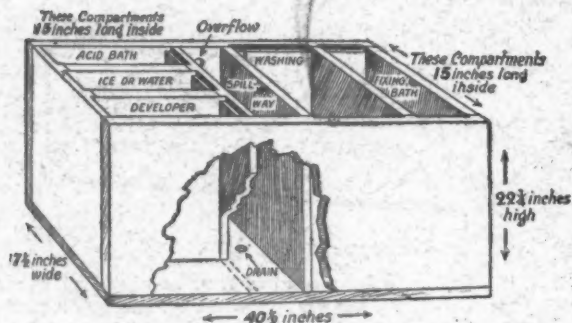
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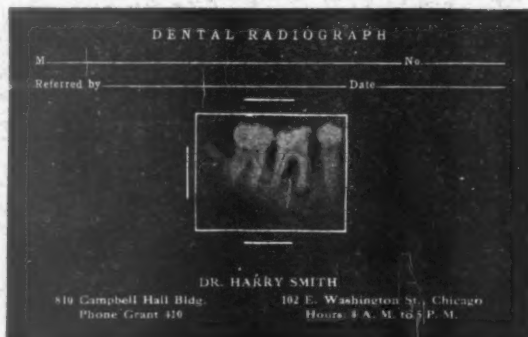
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A NEW ONE

We have a cardboard mount without celluloid to hold the new Eastman film with frosted back.



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